# DISCUSSION PAPER

# OPTIONS TO REDUCE LIGHT DUTY VEHICLE EMISSIONS IN BRITISH COLUMBIA

## FINAL REPORT

**Prepared for: BC Ministry of Finance and Corporate Relations**

**Prepared by: Dan Perrin**
**Perrin, Thorau & Associates Ltd.**

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# Executive Summary

## *Purpose*

The purpose of this discussion paper is to promote an informed discussion of how best the Government of British Columbia could take action to reduce greenhouse gas (GHG) and criteria air contaminant (CAC) emissions from light duty motor vehicles, consistent with the Terms of Reference (see "Appendix A").

The discussion paper has been developed through a process involving the interested parties (see "Appendix B"). This was done not to reach consensus but to attempt to provide a balanced and objective study of the major policy options available to reduce light duty motor vehicle emissions. The interested parties have provided input into the drafting of the discussion paper and have been given an opportunity to provide Position Papers for inclusion in the discussion paper (see "Appendix B"). As can be seen from the Position Papers, this is a contentious issue.

The discussion paper:

- provides background on the environmental issues, the light duty motor vehicle market and the set of relevant government programs and measures as context;
- discusses how various options can be compared and evaluated; and,
- outlines 22 options for addressing light duty motor vehicle emissions, including a discussion of the environmental effectiveness, economic impacts, social impacts, level of uncertainty and the degree of public acceptability for each option.

No recommendations are made as this paper is intended to provide information for further discussion with interested parties and the public prior to any decision by the Government of British Columbia on further action.

## *Background*

There are two main atmospheric issues related to motor vehicle emissions: climate change resulting from GHG emissions; and health concerns related to air pollution generated by CAC emissions. Both are significant environmental problems but differ in the sense that climate change is a global issue affecting the entire planet while air pollution is primarily a local issue in and around communities and dependent on climate and geography.

In both cases, light duty motor vehicles are one source of emissions but there are other significant transportation sources (i.e. the heavy duty vehicle, off-road vehicle, rail, marine and air modes of transportation) and point sources (i.e. industrial, residential and commercial sources) of both types of emission.

Light duty motor vehicles (LDMV), which include passenger automobiles, light pickup trucks, vans and sport utility vehicles, account for about 17% of British Columbia's GHG emissions, which are in total about 9% of Canadian GHG emissions. Light duty motor vehicles currently account for about 37% of air pollution in the Lower Fraser Valley (including the Lower Mainland), the region in British Columbia where light duty motor vehicles have the greatest impact on air quality.

Air pollution has been recognized as a serious issue for longer than climate change and, as a result, more effort has been devoted to solving the problem. In the case of light duty motor vehicle CAC emissions, emission standards in Canada and the United States have become increasingly stringent, reducing light duty motor vehicle emissions by using technology to remove contaminants from exhaust before it is emitted from the tailpipe. AirCare, a vehicle inspection and maintenance program, is another significant measure in place in the Lower Fraser Valley. As a result of these and other measures already in place or being implemented, CAC emissions from light duty motor vehicles are expected to be reduced significantly over the next decade. A recent report prepared for the provincial government forecasts that by 2020 light duty motor vehicles will account for less than 10 percent of some of the major constituents of CAC.

GHG emissions of conventional light duty motor vehicles can be reduced either by increasing the average fuel efficiency of the vehicle fleet or by reducing vehicle usage.[1] In general, measures which only increase fuel efficiency of conventional vehicles are not expected to have a positive complementary impact on CAC emissions but measures which act to reduce vehicle usage will also reduce CAC emissions.

An examination of the structure of the light duty motor vehicle market in British Columbia reveals a number of relevant facts:

- there has been a shift in the mix of vehicles sold and vehicles in the fleet from passenger cars to light duty trucks, which includes pick-up trucks, vans and sport utility vehicles throughout Canada, including British Columbia;
- passenger cars are on average considerably more fuel efficient than light duty trucks;
- new vehicle sales have grown more slowly in British Columbia compared to the rest of Canada, and the rate at which vehicles are scrapped and turned-over is lower so that the average age of vehicles is higher in British Columbia than the Canadian average; and
- on average, older vehicles are less fuel efficient and more polluting than newer vehicles.

## *Comparing Options*

Any government measure intended to reduce light duty motor vehicle emissions will have a wide range of impacts and effects. In order to provide a basis for comparison of different options it is necessary to categorize those implications and to consider the type and magnitude of the implications.

The first type of impact that needs to be considered is the contribution that an option can make to achieving the environmental objective. That, in turn, requires that the objective be defined.

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[1] Another approach would be "fuel switching" which means increasing the use of alternative fuels that have lower life-cycle GHG emissions from production through ultimate use, such as propane, natural gas, hydrogen produced from certain sources and ethanol from biomass. Fuel switching is not addressed directly in this discussion paper but is dealt with in other policy measures and venues, such as the Cleaner Technology Vehicles Committee and the Alternative Fuels Policy (preferential fuel tax rates and PST rebates).

Given the fact that both reduction of GHG emissions and CAC emissions are important but that light duty motor vehicle CAC emissions have been addressed more fully than GHG emissions:

> **The environmental objective is to reduce GHG emissions from light duty motor vehicles, but not at the expense of increased CAC emissions (air pollution), and those measures that reduce GHG emissions and also improve air quality should be favoured.**

Other impacts that have been identified as important include:

**Economic Implications** – these include macro-economic impacts, impact on businesses, compliance and administrative costs, regional distribution impacts and impacts on inflation;

**Social Implications** – these include impacts on low-income individuals, impacts on the disadvantaged, congestion, safety and health implications;

**Uncertainty** – some options are minor changes to existing measures or have been successfully implemented elsewhere, so that there can be considerable confidence in what needs to be done to be successful and on what the outcome will be. Others have not yet been implemented in the form being suggested in British Columbia or any similar jurisdiction, generating considerably more uncertainty about the needed administrative and legal arrangements as well as about the outcome; and

**Public Acceptability** – this assesses the factors which may determine whether or not the public would be accepting of an option being implemented. Government is unlikely to implement or maintain a measure that generates strong public resistance and, to be effective, most options would need to be maintained for the foreseeable future.

The discussion paper does not attempt to evaluate the options quantitatively. Where there are sources of existing quantitative evaluations, these have been reported. However, in general the analysis is qualitative in nature and is intended to show the types of implications that need to be taken into account rather than to suggest which implications are most important or to rank the options.

## *Options*

The following is a brief description of each of the options considered:

**1. Status Quo** – no changes at this time. The justification might be that high fuel prices are already taking care of the problem for now; that the federal government has just released a GHG action plan (October 6, 2000) which addresses the issue nationally; or that the GHG issue can not be effectively or cost effectively addressed at the provincial government level.

**OPTIONS TO IMPROVE FUEL EFFICIENCY**

**Vehicle Feebate** – revenue-neutral economic incentive to purchase vehicles that are more fuel efficient by imposing a fee on sales of vehicles that are less fuel efficient than the

average and providing a rebate to purchasers of vehicles that are more fuel efficient than the average. Sub-options include:

2. **Standard Feebate for New Vehicles** – maximum fee of $4,000, applied across all new vehicles;
3. **New & Used Vehicle Feebate** – applied to sales of new and used vehicles;
4. **Feebate on Classes of Vehicles** – feebate schedules applied separately to different vehicle classes (i.e. different schedules for passenger cars and light trucks);
5. **Feebate to Replace the Luxury Tax** – feebate would replace current higher PST rate for new vehicles over $32,000;
6. **High Efficiency Vehicle Feebate** – low fee for conventional vehicles, large rebate for high efficiency vehicles.

7. **Annual Vehicle License Feebate** – revenue-neutral change in annual vehicle license fees to reward more fuel efficient vehicles and impose higher annual costs on less fuel efficient vehicles;
8. **Fuel Efficiency Standards** – regulatory requirements for fuel efficiency of new vehicles;
9. **Voluntary Fuel Efficiency Measures** – agreement with industry to work voluntarily to increase fuel efficiency;
10. **Fuel Quality Standards** – enhanced fuel quality regulatory requirements;
11. **Fuel Quality Tax Measure** – tax incentive to encourage the purchase or availability of higher quality fuel as enhanced fuel quality standards are phased in;
12. **Enhanced Scrap-It Program** – enhancement of existing program directed toward the purchase and scrapping of older, less fuel efficient and more polluting vehicles;
13. **Enhanced AirCare Program** – increased emphasis on fuel efficiency within the vehicle inspection and maintenance (I&M) program in the Lower Fraser Valley with a possible geographic expansion of the program; and
14. **Public Education Regarding Fuel Efficiency** – raising public awareness of the environmental implications of fuel efficiency and ways to increase fuel efficiency.

## OPTIONS TO REDUCE VEHICLE USE

15. **Distance Based Insurance** – a voluntary program where insurance premiums are calculated based on vehicle usage[2] since risk varies with the amount and other characteristics of vehicle usage, which employs intelligent transportation systems (ITS) technology to automate collection of usage data;
16. **Tax Shift to Increased Variable Vehicle License and Other Government Fees** – charging a significant vehicle usage fee, employing ITS technology to automate collection of usage data and using the incremental revenue to reduce one or more other taxes or revenue sources;

[2] Note that this does not mean that vehicle usage is the only factor in setting insurance premiums and factors such as previous driving record would still affect premium rates.

17. **Tax Shift to Road Tolls** – introduction of a comprehensive set of road tolls or usage fees in urban areas and main highways designed to increase the cost per kilometre driven and reduce congestion, ITS technology to automate collection of usage data and using the revenue collected to reduce one or more other taxes or revenue sources; and

18. **Parking Policy** – economic and supply management measures to provide incentives to reduce vehicle trips taken by reducing the supply and/or increasing the cost of parking.

**OPTIONS TO ADDRESS BOTH**

19. **Tax Shift to Fuel Tax** – revenue neutral economic incentive to reduce vehicle usage and indirectly, to shift consumers to more fuel efficient vehicles by increasing fuel tax and reducing another revenue source;

20. **Tax Shift to Fuel Tax if Fuel Prices Fall** – fuel taxes would be increased in a revenue neutral manner if fuel prices fall below a specified level to maintain part of the GHG reduction impacts of current high fuel prices;

21. **Emission Capping and Trading** – providing a tradable emission allocation to individuals within the context of a comprehensive, international GHG capping and trading regime; and

22. **Combination of Options** – undertaking more than one option, such as combining the Annual Vehicle License Feebate, Enhanced Scrap-It Program, Enhanced AirCare Program, Public Education and Distance Based Insurance.

Even though this list includes 22 different options, it is not comprehensive. There are options that have not been considered either because they have not been raised as serious options by the participants or because they are clearly not feasible. One such option would be to ban certain vehicles from being sold in British Columbia based on their fuel efficiency or other characteristics. Although approaches under which government imposes limitations on consumer choice are technically possible, such approaches would clearly be unacceptable to the public, the business community and the government, and have not been considered in this discussion paper.

The following table summarizes the analysis of implications for the options considered:

| Option | Environmental Objective | % LDMV GHG Reduction by 2020 | Economic Implications | Social Implications | Administrative Uncertainty | Public Acceptability |
|---|---|---|---|---|---|---|
| **1. Status Quo** | **Baseline - could be a >30% reduction relative to 1999 levels if prices do not fall** | | **Baseline** | **Baseline** | **None** | **Baseline** |
| **Options to Increase Fleet Fuel Efficiency** | | | | | | |
| **2. Standard Feebate for New Vehicles** | Relatively modest GHG reductions. Slight CAC emission increase due to take back effect and reduction in vehicle turnover. | 2 to 3% | GDP effect depends on administrative cost. Business impact primarily on autodealers due to reduced vehicle sales. | Not regressive and no limit to consumer choice. Would make congestion and traffic safety issues somewhat worse. | Moderate - Ontario program in place and considerable work undertaken elsewhere - significant outstanding design concerns. | Likely to arise from the cumulative effect, regional implications and relatively low environmental effectiveness. |
| **3. New & Used Vehicle Feebate** | GHG reductions somewhat higher than Standard Feebate and a positive impact on CAC emissions. | 7 to 10% | Higher economic cost and business impact than Standard Feebate. | Same as above. | Greater uncertainty than Standard Feebate. | Less acceptable than Standard Feebate. |
| **4. Feebate on Classes of Vehicle** | GHG and CAC impacts about the same as Standard Feebate. | <2.5% | Higher economic cost than Standard Feebate. | Same as above. | Same as Standard Feebate. | Less acceptable than Standard Feebate. |
| **5. Feebate to Replace the Luxury Tax** | GHG impact slightly less than Standard Feebate. | <2.5% | If revenue neutral, about the same as Standard Feebate. If revenue cost, would be stimulative and offset some business impact. | Same as above. | Same as Standard Feebate. | If revenue neutral, possibly less acceptable.<br>If revenue cost, possibly more acceptable. |
| **6. High Efficiency Vehicle Feebate** | Significantly less effective than Standard Feebate. | <1% | Low economic impact. Would benefit certain manufacturers and automobile dealers disproportionately. | No social impact. | Same as Standard Feebate. | Possibly more acceptable. |
| **7. Annual Vehicle License Feebate** | Would increase average fuel efficiency of the fleet by providing an incentive across the whole fleet. Would also reduce CAC emissions. | 2 to 10% | No macroeconomic impact but some business impacts. Little impact to vehicle manufacturers or automobile dealers. | Possibly somewhat regressive. Health and safety improvements. Some increase in congestion. | Small - an adjustment to an existing fee, but using a basis not previously applied (fuel efficiency rating). | May be seen as a fee increase and biased against areas outside the Lower Mainland. |
| **8. Fuel Efficiency Standards** | GHG and pollution reductions about the same as Standard Feebate. | 2 to 3% | Similar to Standard Feebate. | Reduction in consumer choice. Other impacts similar to Standard Feebate. | Significant - never before attempted. | Unacceptable due to reduction in consumer choice. |
| **9. Voluntary Fuel Efficiency Measures** | Possibly up to the impact of Standard Feebate. | Up to 2.5% | Low economic impact. | Similar to Standard Feebate. | Significant - not previously attempted. | No apparent concerns. |
| **10. Fuel Quality Standard** | Possible GHG emission reduction from some new vehicles. CAC emission reductions from all vehicles. | <1% | Possible fuel price increase. | Few significant implications. | Moderate - existing BC-only standard - debate among stakeholders regarding potential environmental impact | Any fuel price effect may cause resistance. |
| **11. Fuel Quality Tax Measure** | Same as above. | <1% | Depends on design but not likely significant. | Few significant implications. | Moderate - similar previous measure - debate among stakeholders regarding potential environmental impact | Likely acceptable unless perceived as a tax increase. |
| **12. Enhanced Scrap-It Program** | Modest reduction in both GHG & CAC emissions. | 2 to 4% | Low cost and economic impact. | Benefits low income earners. | Small - minor adjustment to existing program. | No apparent concerns. |
| **13. Enhanced AirCare Program** | Potentially significant GHG reduction in Lower Mainland (and Vancouver Island/Okanagan if program expanded). | Unknown but likely >2% and <10% | Increased administrative and compliance costs. | Few significant implications. | Minor adjustment to existing program but work is needed to determine the technical feasibility and GHG impact of the measure. | If fees, repair costs and/or testing time increase, could meet significant resistance. |

| Option | Environmental Objective | % LDMV GHG Reduction by 2020 | Economic Implications | Social Implications | Administrative Uncertainty | Public Acceptability |
|---|---|---|---|---|---|---|
| **14. Public Education** | Modest benefits. | Unknown but likely <1% | Low economic impact. | Potential improvements in congestion and safety. | Small - part of the ongoing responsibility of government in many areas. | No apparent concerns. |
| **Options to Reduce Vehicle Distance Traveled** | | | | | | |
| **15. Distanced Based Insurance** | Relatively significant GHG & CAC emission reduction, less than fuel tax. | Unknown but likely >10% | Economic benefit from reduced cost of accidents, partially offset by administrative costs. | Progressive measure. Increased traffic safety. Reduced congestion. | Moderate - only one existing program. Phase-in and voluntary program should mitigate uncertainty. | Concerns about administrative burden and privacy. Offset if voluntary program. |
| **16. Tax Shift to Variable Licence and Other Government Fees** | Similar to distance based insurance, depending on size of fee and program design. | Unknown - 1¢ per kilometre likely 2 to 8% | Should be little overall direct impact but significant administrative costs. Will be distributional effects. | Regressivity can be offset by tax shift. Increased traffic safety. Reduced congestion. | Significant - no known programs and little scope for phase-in or voluntary program. | Issues are convincing public of true revenue neutrality and concerns about administrative burden and privacy - no scope for voluntary program.. |
| **17. Parking Policy - increasing parking cost and reducing supply** | Potential for GHG & CAC emission reductions. | Unknown 1 to 10% | Economic costs due to increased cost of parking. | Will be regressive if alternatives unavailable. Increased traffic safety. Reduced congestion. | Moderate - examples of parking policy measures are available but not widespread. | Public resistance to increased costs expected. |
| **18. Tax Shift to Road Tolls** | Significant GHG & CAC emission reduction, similar to fuel tax. | Unknown - comprehensive likely >10% and <40%; major highways <1% | Should be little overall impact. Will be distributional effects for commercial vehicles and regional implications. Commercial concerns could be addressed in toll design | Most direct impact on congestion and traffic safety. May be regressive if alternatives are unavailable but can be addressed in toll design and tax shift tax reduction | Significant - tolls are well established but ITS based wide-area road use pricing is not. | Issues are convincing public of true revenue neutrality and public resistance to increased vehicle costs. Privacy issue. |
| **Options to Affect Both** | | | | | | |
| **19. Tax Shift to Fuel Tax (e.g. 2¢ to 3¢ annual increase offset by PIT/CIT decrease)** | Relatively significant GHG & CAC emission reductions. | Annual increase 2¢ - 21 to 44% 3¢ - 33 to 66% | Should be little overall impact. Will be distributional impacts which could be reduced by tax shift. | Regressivity of fuel tax can be offset by tax shift. Increased traffic safety. Reduced congestion. | Small - fuel tax and other affected taxes are well established and can be readily changed. | Issues are convincing public of true revenue neutrality and public resistance to increased vehicle costs. |
| **20. Tax Shift to Fuel Tax if Fuel Prices Fall** | Would maintain some of the GHG & CAC emission reductions of current high fuel prices. | Unknown | Should be little overall impact. Will be distributional impacts which could be reduced by tax shift. | Regressivity of fuel tax can be offset by tax shift. Increased traffic safety. Reduced congestion. | Small - fuel tax and other affected taxes are well established and can be readily changed. | Issues are convincing public of true revenue neutrality and public resistance to increased vehicle costs. |
| **21. Emissions Capping and Trading** | Potential for significant GHG reductions - would be complementary CAC emission reductions, amount depending on the cost of light duty motor vehicle GHG reductions. | Unknown | In principle, would have the lowest economic impact. In fact, the impact will depend on administrative costs, which could be significant or modest, depending on design. | Would not be regressive and would likely have complementary congestion and traffic safety benefits. | Significant - although the subject of considerable work around the world, implementation of a comprehensive international system is clearly a long ways off. | Would depend on administrative complexity for vehicle owners and perceived costs to vehicle owners. Privacy issue. |
| **22. Combination - Annual Vehicle License Feebate, Enhanced Scrap-It Program, Enhanced AirCare Program, Public Education and Distance Based Insurance** | Potential significant GHG and CAC emission reductions as the programs work together to increase fleet efficiency, reduce vehicle usage and increase public awareness. | Sum of impacts 20 to 50% | Mix of business impacts (license fee, AirCare), macroeconomic benefits DBI) and fiscal costs (Scrap-It, Public Education). | No significant regressivity. Mix of congestion increases and decreases. Positive health and safety impacts. | Moderate - most elements have little uncertainty, except DBI. | AirCare and License Fee components likely to meet the greatest resistance. May be offset by being part of a comprehensive program. |

## *Concluding Comments*

This analysis shows that there is a wide range of possible measures that could be implemented to reduce light duty motor vehicle emissions with differing levels of environmental effectiveness, economic impacts, social impacts, uncertainty and public acceptability implications. Some general observations that arise from the analysis include:

- "The devil is in the details." The discussion paper has not developed, in detail, all of the administrative and legal issues that would need to be addressed to implement these options. The particular details chosen can significantly affect the implications.
- Public acceptability could be a significant issue with many of the options. In general, public acceptance will require that either:
  - the public be convinced that climate change is a significant issue and that the province of British Columbia needs to make changes now; or
  - the measure is intended to address another problem that the public agrees needs to be addressed and that the climate change implications are a complementary benefit.
- Transparency is important. For example, for any tax shift option the fiscal impacts should be measured and publicly reported on an ongoing basis to demonstrate revenue neutrality and there should be ongoing monitoring and reporting on the environmental effectiveness of any option that is implemented.
- The current increase in fuel prices may go a long way towards reducing light duty motor vehicle GHG emissions. According to Statistics Canada, prices increased by 53% percent in British Columbia over the period March, 1999 to July, 2000. That could reduce light duty motor vehicle GHG emissions by 30 to 50 percent in the long run if prices do not fall.
- There is a strong link between any provincial government action on this issue and the proposed TransLink vehicle levy currently under consideration, which would affect about half of the vehicles in the province. Any provincial government measure would need to be coordinated with and take any TransLink decision on the vehicle levy into account.
- Several of the options, especially those rated high in terms of uncertainty, would benefit from pilot projects or phase-in, to help mitigate public concerns and minimize administrative and compliance costs if they are chosen to proceed.
- It is evident from the Position Papers included in Appendix B that the focus of the interested parties is on the feebate option. Business related interested parties and the BC Automobile Association are opposed to a feebate on several grounds but consistently because they believe it would impose costs on business and consumers with little environmental benefit. Environmental groups are in favour of a feebate for several reasons, including concern about the trend towards the purchase of larger, less fuel efficient vehicles and the need for some jurisdiction to take the initial step.
- In spite of the focus by many interested parties exclusively on feebate, the analysis shows that there are other options[3] that clearly deserve more discussion as they may be environmentally effective, have low economic and social costs or provide benefits, be relatively certain and be reasonably acceptable to the public.

[3] Such as Annual License Feebate, Distance Based Insurance, Enhanced Scrap-It Program, Enhanced AirCare Program and Public Education.

# Glossary of Terms

***Alternative Fuel Vehicles:*** Are vehicles that are either exclusively or partly powered by electricity, propane, ethanol, methanol or natural gas.

***AirCare:*** An inspection and maintenance (I&M) program operating in the Lower Fraser Valley regions of British Columbia, directed towards reducing CAC emissions of light duty motor vehicles.

***Corporate Average Fuel Economy (CAFE) Standards:*** Are fuel economy standards that apply to all vehicles sold in the U.S. Under CAFE, each manufacturer must ensure that on average the vehicles sold by that manufacturer meet the standard.

***Corporate Average Fuel Consumption (CAFC) Standards:*** Are the Canadian counterpart to the CAFE standards, which have been implemented through a voluntarily agreement with vehicle manufacturers. The Canadian standard is known as CAFC because in Canada fuel efficiency is measured in terms of units of fuel *consumed* to travel a given distance (litres per 100 kilometres) rather than in terms of distance per unit of fuel (miles per gallon).

***Criteria Air Contaminants (CAC) or Criteria Pollutants:*** Are pollutants that lower air quality and affect health. CACs include carbon monoxide (CO), nitrogen oxides (NOx), sulphur oxides (SOx), ground level ozone and particulate matter.

***Disposable Income:*** Is after-tax income and is the income over which individuals can make consumption and savings choices.

***Economic Efficiency of a Tax:*** The degree to which a tax lets the economy continue to produce those goods and services that are in demand at the lowest cost.

***Economic Incentives:*** Are government policy tools that influence behaviour by changing the relative prices of goods and services.

***Elasticity:*** Is a numerical description of how responsive behaviour is to a change in an economic variable such as the price of a good or a person's income.

***Emissions:*** Are byproducts of fuel combustion that are emitted from vehicle exhaust pipes. Emissions include greenhouse gases, which cause climate change, and CACs, which contribute to poor air quality and can affect health.

***Externality:*** A cost of using a good that is not captured in the market price of that good. Environmental degradation is an externality.

***Feebate:*** A policy tool whereby fees are charged on goods or activities with specific characteristics to discourage their use and rebates are offered to goods or activities with different characteristics to encourage their use. A feebate is often designed so that the revenues, net of administrative costs, are entirely redistributed as rebates (i.e. to be revenue neutral).

***Fixed Cost of Operating a Vehicle:*** Is a cost that, once paid, does not vary with vehicle usage. Currently, vehicle insurance and license fees are fixed costs.

***Fuel:*** refers to both diesel fuel and gasoline in this paper, except where a specific distinction is made (e.g. in the discussions of alternative fuel vehicles, and fuel tax rates.)

***Fuel Efficiency:*** The amount of fuel used by a vehicle to travel a specified distance under controlled conditions that specify factors such as speed and the number of stops.

***Greenhouse Gases (GHGs):*** Gases that trap solar energy and contribute to climate change. The most common greenhouse gas is carbon dioxide ($CO_2$). Other greenhouse gases include nitrous oxide ($N_2O$) and methane ($CH_4$).

***Hybrid Vehicles:*** Are vehicles that use one type of fuel together with electricity to power the vehicle. Most current hybrids use electricity and gasoline.

***Incidence of a Tax:*** Is a description of which groups of taxpayers ultimately bear the burden of a tax.

***Kyoto Protocol:*** The Kyoto Protocol is a proposed international treaty that would commit industrialized countries to reduce greenhouse gas emissions to specific levels by specific target dates, usually 2010. Developing countries would not be committed to reducing their greenhouse gas emissions.

***Light Duty Motor Vehicles:*** Are passenger automobiles and light duty trucks (up to and including 3/4 ton trucks) including pickup trucks, vans and sport utility vehicles.

***Market Failure:*** Occurs when the market price of a good or service does not capture its true cost of production. For example, the true cost of producing a good includes the cost to society of the pollution generated by its production, but this cost is not included in its market price.

***Progressivity:*** A progressive tax is one where tax as a percentage of income increases with income. The personal income tax is an example of a progressive tax.

***Regressivity:*** A regressive tax is one where the tax as a percentage of income goes down as incomes increase.

***Revenue Neutrality:*** Is a type of tax policy in which there is no net impact on total government revenues. That is, any increase in the taxes paid by some individuals or businesses are completely offset by reductions in the taxes paid by others, after paying any costs of administration. Note that the concept of revenue neutrality is from the perspective of government, not the perspective of the individual taxpayer, whose taxes may increase or decrease.

***Take-Back Effect:*** Refers to the fact that some of the reduction in GHGs that result from increases in fuel efficiency will be offset by increases in vehicle usage as the increased fuel efficiency makes travel less expensive. Estimates of the magnitude of the take-back effect vary from 10 to 40 percent of the impact of increased fuel efficiency.

***Tax Shift:*** Is a policy of changing the tax system to tax goods and services that are considered harmful to society more than goods and services that are not harmful. It is designed to encourage desirable behaviour and to discourage behaviour that is undesirable.

***Tier 1 and Tier 2 Regulatory Standards:*** Are CAC emission standards for light duty vehicles imposed by the US Environmental Protection Agency, which are set in terms of the amount of specific contaminants that may be released when a vehicle is driven a given distance. Tier 1 standards have been in place for several years and Tier 2 standards are required to be met by the year 2004. Canada currently applies the existing Tier 1 standards and is expected to adopt harmonized Tier 2 pollution emission standards. Under Tier 1 standards, passenger vehicles and light duty trucks are subject to different standards but under Tier 2 standards the same emission standards have been proposed for all "regulated" vehicles, regardless of the type of fuel they use or the type of vehicle. Regulated vehicles are basically equivalent to light duty motor vehicles.

***Variable Costs of Operating a Vehicle:*** Are costs that vary according to vehicle usage. Fuel costs are variable costs.

***Vehicle Fleet:*** The collection of active vehicles in a geographic area including both new and used vehicles.

# List of Acronyms

***AFV:*** Alternative Fuel Vehicle.

***CAC:*** Criteria Air Contaminants.

***CAFE:*** Corporate Average Fuel Economy.

***CAFC:*** Corporate Average Fuel Consumption.

***CIT:*** Corporation Income Tax.

***CCT:*** Corporation Capital Tax.

***CNG:*** Compressed Natural Gas.

***CTV:*** Cleaner Technology Vehicles.

***ENGO:*** Environmental Non-Governmental Organization.

***EPA:*** Environmental Protection Agency.

***FER:*** Fuel Efficiency Rating.

***GDP:*** Gross Domestic Product.

***GERT:*** Greenhouse Gas Emissions Reduction Trading pilot.

***GHG:*** Greenhouse Gas.

***GPS:*** Global Positioning System.

***GST:*** Goods and Services Tax.

***GVRD:*** Greater Vancouver Regional District.

***GVW:*** Gross Vehicle Weight.

***HOV:*** High Occupancy Vehicle.

***I&M:*** Inspection and Maintenance programs (e.g. AirCare)

***ICBC:*** Insurance Corporation of British Columbia.

***ITS:*** Intelligent Transportation Systems.

***LDMV:*** Light Duty Motor Vehicle.

***LEV:*** Low Emissions Vehicle.

***NCCP:*** National Climate Change Process.

***MMT:*** Methylcyclopentadienyl Manganese Tricarbonyl.

***$NO_x$:*** Nitrogen Oxides, part of CAC.

***NRCan:*** Natural Resources Canada

***OECD:*** Organisation for Economic Co-Operation and Development

***OPEC:*** Organization of Petroleum Exporting Countries.

***PNGV:*** Partnership for New Generation Vehicles.

***PIT:*** Personal Income Tax.

***PST:*** Provincial Sales Tax or Social Services Tax.

***R&D:*** Research and Development.

***SUV:*** Sport Utility Vehicle.

***TC:*** Transport Canada

***TDM:*** Transportation Demand Management.

***VOC:*** Volatile Organic Compounds, part of CAC.

***WWFC:*** World-Wide Fuel Charter.

# Introduction

The purpose of this discussion paper is to promote an informed discussion of the question of how best the British Columbia government can take further steps to reduce light duty motor vehicle emissions[4] in accordance with the Terms of Reference (see "Appendix A").[5]

This issue, as with most environmental issues, is fraught with significant differences of opinion among those with a direct interest. While there is considerable agreement that light duty vehicle emissions are an environmental issue, there is little agreement on:

- how significant the problems are now and will be in the future without further action;
- whether additional provincial government measures are needed or would be effective in dealing with the problems; and
- which measure(s) would be best or even what criteria should be used to determine which would be best.

Since this is a contentious issue, Perrin, Thorau and Associates Ltd. has been retained as an independent consultant to draft this discussion paper following a process involving those with a direct interest in the issue (see "Appendix B" for a list of participants). Following the process, participants were provided with an opportunity to submit Position Papers for inclusion in the discussion paper, which may also be found in Appendix B.

The process has provided participants with an opportunity to provide significant input into the development of the paper but the process was not designed to reach consensus and this paper does not represent a consensus view.

The paper is organized as follows:

- a discussion of the context including: the environmental issues; the motor vehicle market; a description of relevant government programs in British Columbia and in other jurisdictions; and actions taken by industry;
- a discussion of the environmental objective to be achieved and other factors which need to be taken into account when comparing options; and
- an analysis of 22 options for government action that could be taken in British Columbia to reduce light duty motor vehicle emissions.

Options have been limited to those that would have a direct effect on light duty vehicles. While there are many measures which would go beyond light duty vehicles, the options have been limited in keeping with the Terms of Reference to contain the discussion to a manageable set of alternatives. The discussion paper does not make any recommendations.

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[4] See "Glossary of Terms" for definitions of emissions and light duty motor vehicles.

[5] Responsibility for the views expressed in the paper and for any errors is solely that of the author.

# Context Summary

The following summarizes the context within which options for British Columbia government measures to reduce light duty vehicle emissions should be considered.

## *The Environmental Issues*

Light duty motor vehicle emissions contribute to, but are by no means the only source of criteria air contaminant (CAC) emissions that reduce air quality and public health, and greenhouse gas (GHG) emissions that contribute to climate change (sometimes referred to as global warming). Not only are there other transportation sources of emissions but there are also other sources of CACs and GHGs (e.g. residential, commercial and industrial).

### GHG Emissions

GHGs are defined as carbon dioxide ($CO_2$), nitrous oxide ($N_2O$), methane ($CH_4$) and several other gases. $CO_2$ is the most common and the amount of GHG produced is commonly measured in terms of tonnes of $CO_2$ equivalent. These gases are referred to as "greenhouse gases" because they act to trap solar energy, which warms the atmosphere and surface of the earth, thereby affecting climate patterns. Most GHGs occur naturally but human activity, in particular the combustion of fossil fuels, has significantly increased the amount of GHGs in the atmosphere.

There is considerable evidence that the global climate is changing. There is also evidence that this is at least partly due to the GHGs produced by human activity, although there continues to be a scientific debate about the pace, scope, nature and other characteristics of climate change. Climate change has the potential to have significant environmental and economic impacts.

As a result of increasing awareness and understanding of the climate change issue, 150 countries, including Canada, reached agreement on the Kyoto Protocol in December 1997, which will set binding limits on GHG emissions from industrialized countries, if ratified. Canada's target is to reduce average annual GHG emissions to six percent below 1990 levels by 2008 to 2012.

Whether or not the Kyoto Protocol is ratified, the British Columbia government is committed to taking action to reduce GHG emissions in British Columbia and to playing a leadership role in dealing with the issue.

Canada produces about 1.8 percent of the world's total GHG emissions (1990 baseline year)[6] but, on a per capita basis, Canadian emissions are the second highest in the world, with only the United States producing more per capita. Annual emissions growth has slowed in Canada from about 3 percent annually in the mid-1990s to about 1 percent in 1998, in spite of strong economic and population growth. However, the total growth in emissions in Canada between

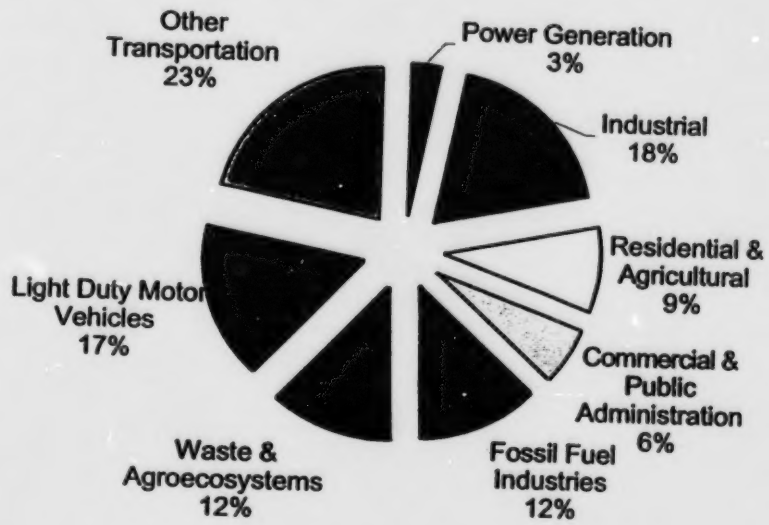
[6] This and other data in this subsection are based on Natural Resources Canada, Canada's Emissions Outlook: An Update, December 1999 (http://www.nrcan.gc.ca/es/ceo/update.htm)

1990 and 1997 of 13 percent was higher than most developed countries and on par with the United States.

In 1997, British Columbia contributed 9.1 percent of Canada's total GHG emissions, up from 8.5 percent in 1990. In 1997, British Columbia GHG emissions were 61.9 megatonnes (million tonnes), up 21 percent from 1990. Without any additional actions to reduce GHGs, emissions in 2010 are forecast to be 73 megatonnes, a 38 percent increase from 1990 levels. However, between 1990 and 1997 GHG emissions per capita grew by only 0.1 percent.

In 1990, the transportation sector was responsible for 37.7 percent of GHG emissions in British Columbia, of which almost half (16.0 percent of total British Columbia GHG emissions) was attributable to light duty motor vehicles. By 2010, the proportion of GHG emissions due to transportation is forecast to increase to 41 percent but the proportion due to light duty motor vehicles is expected to increase only slightly to about 17 percent of total emissions.

**Figure 1 - BC & Territories GHG Emissions by Sector - 1997**




Source: NR Canada, Canada's Emissions Outlook: 1997-2020

This indicates that light duty vehicle GHG emissions are expected to continue to grow at about the same rate as overall British Columbia emissions, which are growing faster than the Canadian average. It should be noted that the emissions forecasts produced by the federal government are based on stable real oil prices. Over the past year crude oil prices have more than doubled and there have been significant increases in fuel prices at the pump. That will have the effect of reducing light duty motor vehicle GHG emissions from the forecast levels unless these price increases are quickly reversed. After two decades of slowly falling real oil prices, there is now considerable uncertainty about future prices.

Although light duty motor vehicles represent a higher proportion of total GHG emissions in British Columbia than in most other provinces, this does not mean that there is significantly higher light duty motor vehicle usage in British Columbia. Rather, it indicates that other sources of emissions in British Columbia are somewhat lower. For example, a larger proportion of electricity generation in British Columbia is hydroelectric than in jurisdictions such as Ontario and hydroelectricity production does not produce GHGs directly.[7]

GHG emissions from light duty motor vehicles can be reduced by:

- Increasing fuel efficiency by reducing the fuel consumed per kilometre driven or moving to propulsion systems that are less reliant on fossil fuels;
- Reducing vehicle distance traveled; and/or
- "Fuel switching" which means increasing the use of alternative fuels that have lower life-cycle GHG emissions from production through ultimate use, such as propane, natural gas, hydrogen produced from certain sources and ethanol from biomass.[8]

This discussion paper is primarily focused on options that address fuel efficiency and vehicle usage. Fuel switching is not addressed directly in this discussion paper but is dealt with in other policy measures and venues, such as the Cleaner Technology Vehicles Committee and the Alternative Fuels Policy (preferential fuel tax rates and PST rebates).[9]

## Air Pollution Emissions

Air pollution is a significant problem in urban areas, with the most significant impacts being on public health. That in turn has significant social and economic costs. A large proportion of CAC pollution arises from human activities, particularly the burning of fossil fuels. In 1995 it was estimated that transportation accounted for 75 percent of air pollution in the Lower Fraser Valley, with almost half of that due to light duty vehicles.

The degree of the air pollution problem in a specific location depends on geography and climate. While air pollution is a problem in all urban areas, geography and climate contribute to making air pollution of special concern in the Lower Fraser Valley. That has resulted in a greater focus on the issue through locally implemented measures such as AirCare (See Appendix C) than in many other major urban areas in Canada and the United States.

Emissions standards coupled with technology advancements in the auto industry have been credited with reducing total vehicle CAC emissions over the past two decades, in spite of increased numbers of vehicles and distance driven. The auto industry has to date introduced several generations of progressively more sophisticated emission control systems to meet increasingly stringent regulatory requirements. Current new vehicles emit less than 10 percent of the pollution emitted by vehicles prior to the introduction of emission standards. The industry

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[7] Reservoirs created behind hydroelectric dams do produce GHGs, primarily as the vegetation on the flooded land rots over time. These GHGs are not currently captured in the GHG inventory.

[8] Ethanol from biomass produces less GHGs when combusted and growing the biomass reduces GHGs by removing $CO_2$ from the air.

[9] Note that a life-cycle approach is required because some fuels that increase light duty motor vehicle fuel efficiency may result in overall higher GHG emissions because of higher emissions during production of the fuel.

has indicated that low emission vehicle technology is being introduced voluntarily on a national basis for all passenger cars and light duty trucks for the 2001 models, which will further contribute to the improved environmental performance of vehicles. Tier 2 regulatory standards being implemented in the United States, discussed in Appendix C, are expected to reduce light duty motor vehicle CAC pollution emissions even further. The Final Report of the BC Clean Transportation Analysis Project indicates that with the Tier 2 standards, by 2020 light duty motor vehicles will be responsible for only 7 percent of Lower Fraser Valley $NO_x$[10] emissions compared with 31 percent in 1995 and for 9 percent of VOC[11] emissions compared with 26% in 1995.[12]

Air pollution generally and light duty motor vehicle CAC pollution emissions specifically have been the focus of public attention and public policy measures for a longer period than GHG emissions. While the air quality problem has not been fully solved, there has been considerable success to date and measures currently in place will continue to reduce light duty motor vehicle CAC pollution emissions for the foreseeable future.

## The Relationship between GHG and CAC Emissions

It seems logical to assume that measures that reduce GHG emissions from light duty motor vehicles will also reduce CAC emissions, but that is not necessarily true. Whether a reduction in GHG emissions will be accompanied by a complementary reduction in CAC emissions depends on the way that the reduction is achieved.

Where GHG emissions are reduced because the total distance driven is reduced, it is clear that there will be a complementary reduction in CAC emissions.

Where GHG emissions are reduced because older, less fuel efficient vehicles in the fleet are replaced by newer, more fuel efficient vehicles, the result is likely to be a complementary reduction in CAC emissions because older vehicles also produce higher CAC emissions than newer vehicles. CAC emission standards have become increasingly stringent over time.

However, where GHG emissions are reduced because new gas guzzlers are replaced by new gas sippers, there will be little or no complementary reduction in CAC emissions. The reason is that all new vehicles must meet similar CAC emission standards,[13] expressed in terms of amount of contaminant emitted per kilometre driven regardless of the amount of fuel consumed. That is, a small fuel efficient vehicle produces the same amount of CAC emissions as a large, fuel inefficient vehicle on a per kilometre basis because the CAC reduction technology is varied to ensure that each specific vehicle meets the standard.

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[10] NOx refers to nitrogen oxides, part of CAC.

[11] VOC refers to Volatile Organic Compounds, part of CAC.

[12] Alchemy Consulting Inc. et al, BC Clean Transportation Analysis Project, Final Report, January 2000, p. vi. www.elp.gov.bc.ca/epd/epdpa/ar/vehicle/index.html#technical

[13] Tier 1 standards currently in place set different standards for passenger automobiles and light duty trucks but Tier 2 standards currently being phased-in are the same for all regulated vehicles. The vehicle manufacturers report that in the 2000 and 2001 model years all vehicles produce essentially identical levels of CAC emissions per kilometre in preparation for complying with Tier 2.

### Gasoline vs. Diesel

For the purposes of this paper, unless a specific distinction is made, a reference to "fuel" is a reference to both gasoline and diesel fuel. It should be noted that diesel vehicles are generally more fuel efficient than the identical gasoline powered vehicle, although they tend to produce more CACs. Much of the large increase in fuel efficiency that is forecast for Europe over the next several years is expected to result from an increase in the number of diesel powered vehicles in the fleet. Options discussed below that would increase the fuel efficiency of the British Columbia vehicle fleet would likely also increase the proportion of diesel powered vehicles, but options to target diesel powered vehicles specifically have not been considered.

## *Vehicle Sales and Fleet Structure*

This section provides some background information about the current light duty vehicle fleet in Canada and British Columbia and sales of new vehicles. The mix and age of vehicles in the total fleet of vehicles in the province are important factors in average fuel efficiency. The amount of GHG emissions from light duty motor vehicles depends on the total distance driven by all the vehicles in the fleet (referred to in the paper as "total vehicle distance traveled") and on the average fuel efficiency of the vehicles in the fleet.

It is also important to understand the place of the automobile industry in British Columbia's economy. There are currently no light duty motor vehicle manufacturing facilities in British Columbia. According to the BC Automobile Dealers Association, British Columbia has almost 400 franchised automobile dealers, representing over 19 major manufacturer groups and employs more than 16,000 people. Franchise auto dealers account for all new light duty motor vehicle sales and 43 percent of used light duty motor vehicle sales. In addition to British Columbia's franchised automobile dealers there are approximately 1,000 used vehicle dealers who account for about 17 percent of used light duty motor vehicle sales. Private party transactions account for approximately 40 percent of used light duty motor vehicle sales. It is estimated that British Columbia has over 2 million light duty motor vehicles in operation.

The following table shows what has happened to the Canadian light duty vehicle fleet since 1990, with projections to 2020. Light duty trucks (including pickup trucks, vans and SUVs) have increased from 24 percent to more than 35 percent of the fleet. On average light duty trucks are significantly less fuel efficient than passenger automobiles. The average, annual growth rate of vehicle-kilometres driven over the period is forecast to be 1.4 percent. Both of these trends mean that light duty vehicle emissions are increasing.

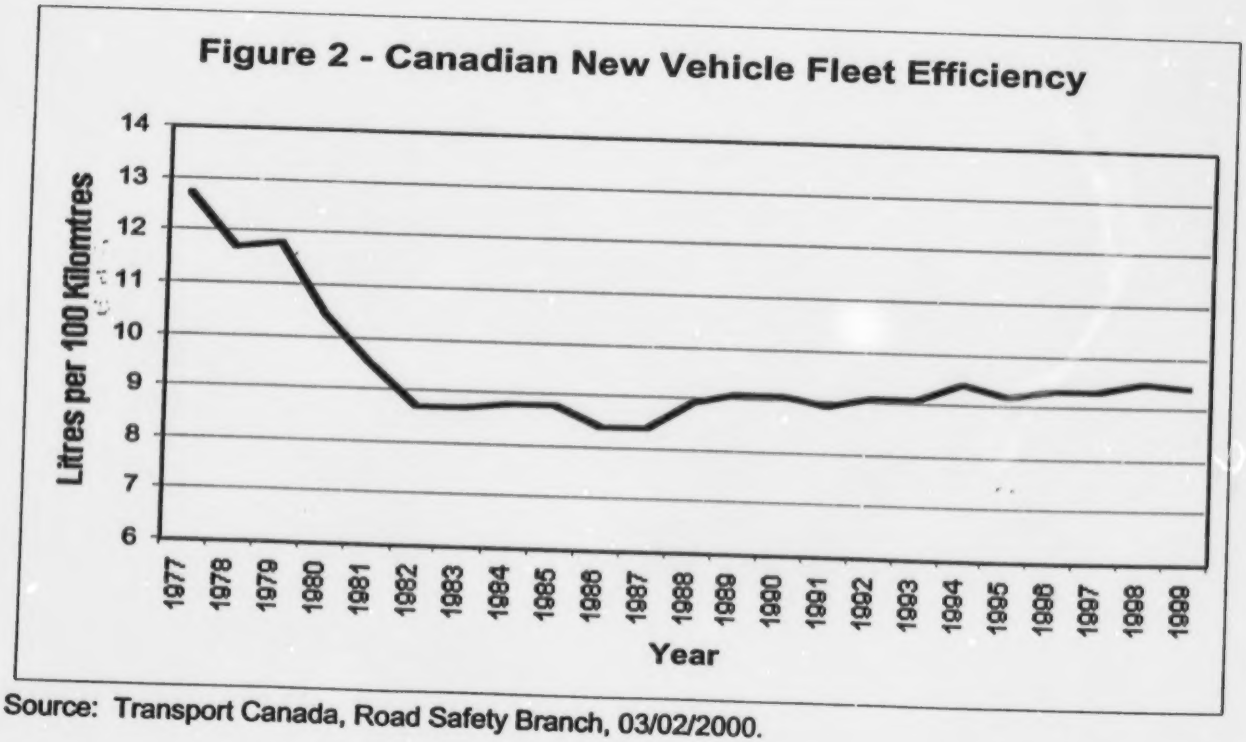
**Table 1 – Canadian Vehicle Fleet**

| | 1990 | 1995 | 2000 | 2010 | 2020 |
|---|---|---|---|---|---|
| Passenger Automobiles (millions) | 11.1 | 10.3 | 9.4 | 9.7 | 12.0 |
| Light Duty Trucks (millions) | 3.5 | 4.3 | 5.2 | 6.8 | 8.6 |
| Total | 14.6 | 14.6 | 14.6 | 16.5 | 20.6 |
| Light Duty Truck percent | 24.0 percent | 29.5 percent | 35.6 percent | 41.2 percent | 41.7 percent |
| Average Automobile Distance Traveled | 16,738 | 18,786 | 19,817 | 19,839 | 19,584 |
| Average Light Truck Distance Traveled | 23,167 | 22,166 | 22,209 | 21,612 | 21,181 |
| Total Vehicle-Kms Traveled (billions) | 265.7 | 289.8 | 300.2 | 339.9 | 407.9 |

Source: NCCP Transportation Table, Transportation and Climate Change: Options for Action, Table 2.7

Figure 2 below shows the average fuel efficiency of the Canadian new vehicle fleet since 1977. It shows that there was a significant improvement in fuel efficiency up to 1987 and since that time the trend has shown somewhat of a reduction in average fuel efficiency.

**Figure 2 - Canadian New Vehicle Fleet Efficiency**




Source: Transport Canada, Road Safety Branch, 03/02/2000.

Table 2 compares vehicle sales in British Columbia in 1995 and 1999 with total Canadian vehicle sales. The table indicates that the growth in sales in British Columbia has been significantly lower than for the country as whole during this period. It also shows that in British Columbia, light duty truck sales increased while passenger automobile sales decreased, so that by 1999 light duty truck sales exceeded passenger automobile sales. The trend in both Canada and British Columbia of light duty truck sales growing faster than passenger automobile sales is important because on average light duty trucks are significantly less fuel efficient than passenger automobiles, as can be seen in Figure 4 below.

**Table 2 – Light Duty Motor Vehicle Sales, B.C. and Canada, 1995 to 1999**

| | British Columbia | | | Canada | | |
|---|---|---|---|---|---|---|
| | 1995 | 1999 | Ave. Annual % chg. | 1995 | 1999 | Ave. Annual % chg. |
| Passenger Car Sales | 74,729 | 71,402 | -1.1 | 669,641 | 806,480 | 4.8 |
| Light Duty Truck Sales | 68,856 | 82,078 | 4.5 | 460,570 | 694,668 | 10.8 |
| Light Duty Vehicle Sales | 143,585 | 153,480 | 1.7 | 1,130,211 | 1,501,148 | 7.4 |
| Pass. Car as % of Can | 11.2 % | 8.9 % | | | | |
| LD Truck as % of Can. | 15.0 % | 11.8 % | | | | |
| LD Vehicle as % of Can. | 12.7 % | 10.2 % | | | | |

Source: 2000 DesRosiers Automotive Yearbook.

Table 3 shows the average age and total number of registered vehicles by province in 1998. The average age of the Canadian fleet increased from 7.2 years in 1989 to 8.3 years in 1998. That is a concern because older vehicles are both less fuel efficient and produce more CAC emissions than newer vehicles. There are several possible explanations for the increase in average vehicle age. One explanation is that personal disposable income has not increased as fast as vehicle prices so that new vehicles have become less affordable. From 1992 to 1999 Disposable Income per Person increased by 12.1 percent on average for Canada.[14] During the same period, the Purchase and Leasing of Automobiles component of the Canadian Consumer Price Index increased by 32 percent.[15]

Another factor may be continuous improvements in vehicle quality which have increased the useful life of light duty motor vehicles. Longer lives for new vehicles reduce the life-cycle GHG emissions associated with a vehicle, since GHG emissions associated with vehicle manufacture are significant.

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[14] Source: BC Stats, Current Statistics (April 2000), Conference Board of Canada, Provincial Outlook (Spring 2000).

[15] Source: Statistics Canada, Consumer Price Indexes for Canada, Monthly, CANSIM Series P100299.

In 1998, British Columbia new vehicle sales accounted for 7 percent of registered vehicles while Canadian new vehicle sales accounted for 8 percent of registered vehicles. This provides a rough indicator of the turnover rate of the vehicle fleet. The lower the turnover rate, the longer it will take for improvements in fuel efficiency and CAC pollution emissions to become established in the vehicle fleet.

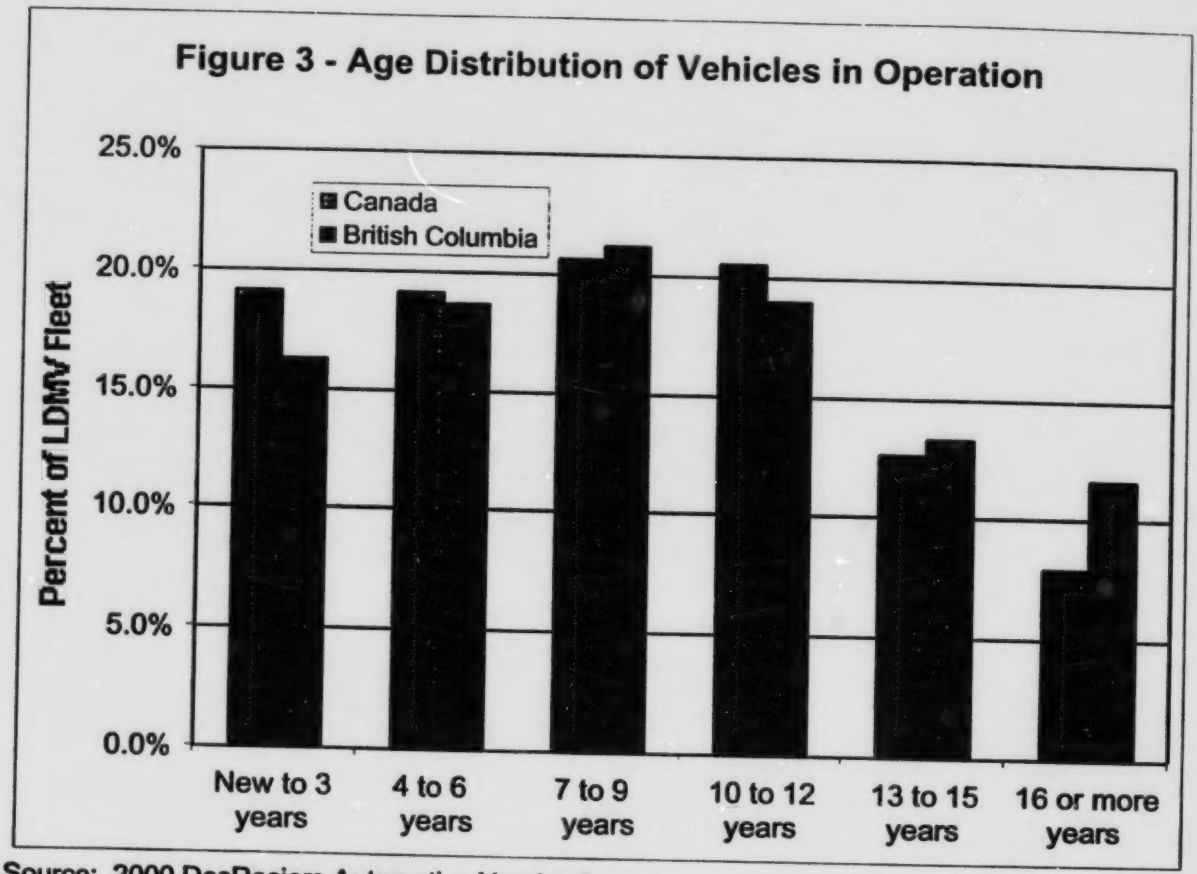
**Table 3 – Average Vehicle Age and Fleet Size by Province, 1998**

| Province | Average Vehicle Age | Number of Vehicles Registered | Percent of Total |
|---|---|---|---|
| British Columbia | 8.7 | 2,081,146 | 12.6 |
| Alberta | 8.8 | 1,797,515 | 10.9 |
| Saskatchewan | 9.8 | 669,491 | 4.0 |
| Manitoba | 8.8 | 610,550 | 3.7 |
| Ontario | 8.0 | 6,234,432 | 37.7 |
| Québec | 7.6 | 3,874,488 | 23.4 |
| New Brunswick | 8.5 | 487,396 | 2.0 |
| Nova Scotia | 8.4 | 420,955 | 2.5 |
| PEI | 9.0 | 79,085 | 0.5 |
| Newfoundland | 7.9 | 262,931 | 1.6 |
| **Total** | **8.3** | **16,535,877** | **100.0** |

Source: DesRosiers Automotive Reports, November 30, 1999.

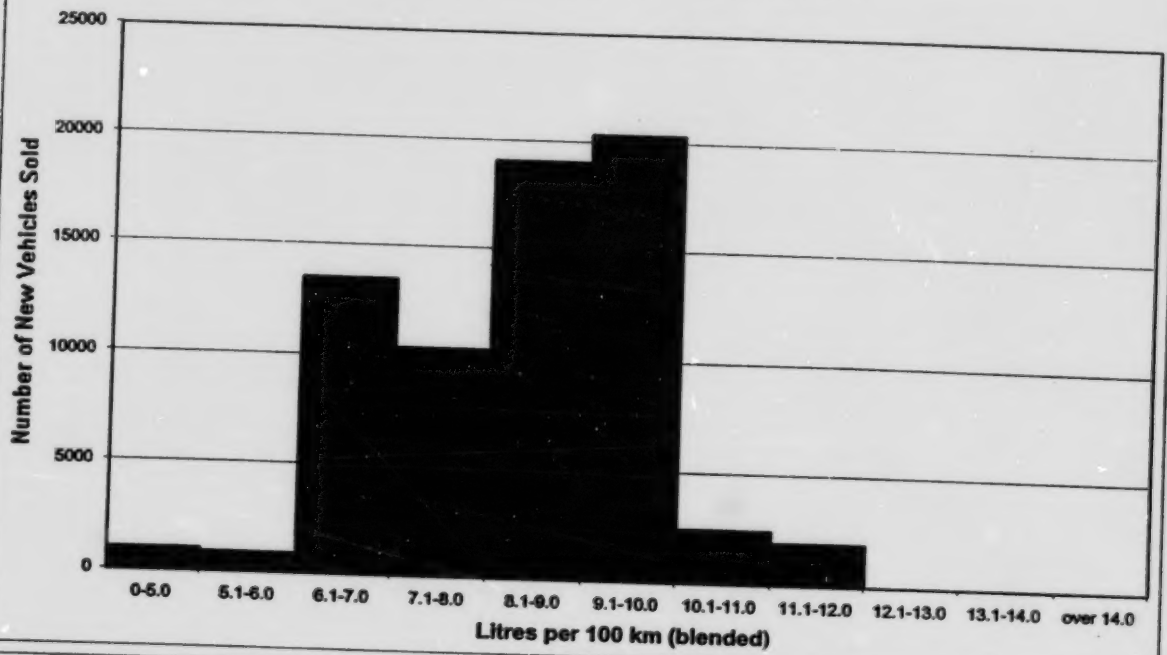
Figure 3 shows that the age of vehicles in British Columbia tends to be older than in Canada as a whole.

The graphs in Figure 4 below show the distribution of the fuel efficiency for new passenger automobiles (new cars) and new light duty trucks for vehicles sold in British Columbia in 1999. This is useful background information for the discussion of the feebate options presented below, since it provides a sense of the distribution of various fuel efficiency levels across vehicles available in British Columbia. The overwhelming majority of passenger automobiles sold have fuel efficiency better than the average of 8.4 litres per 100 kilometres and a significant majority of light duty trucks are less fuel efficient than the average, although some models are better than the average.

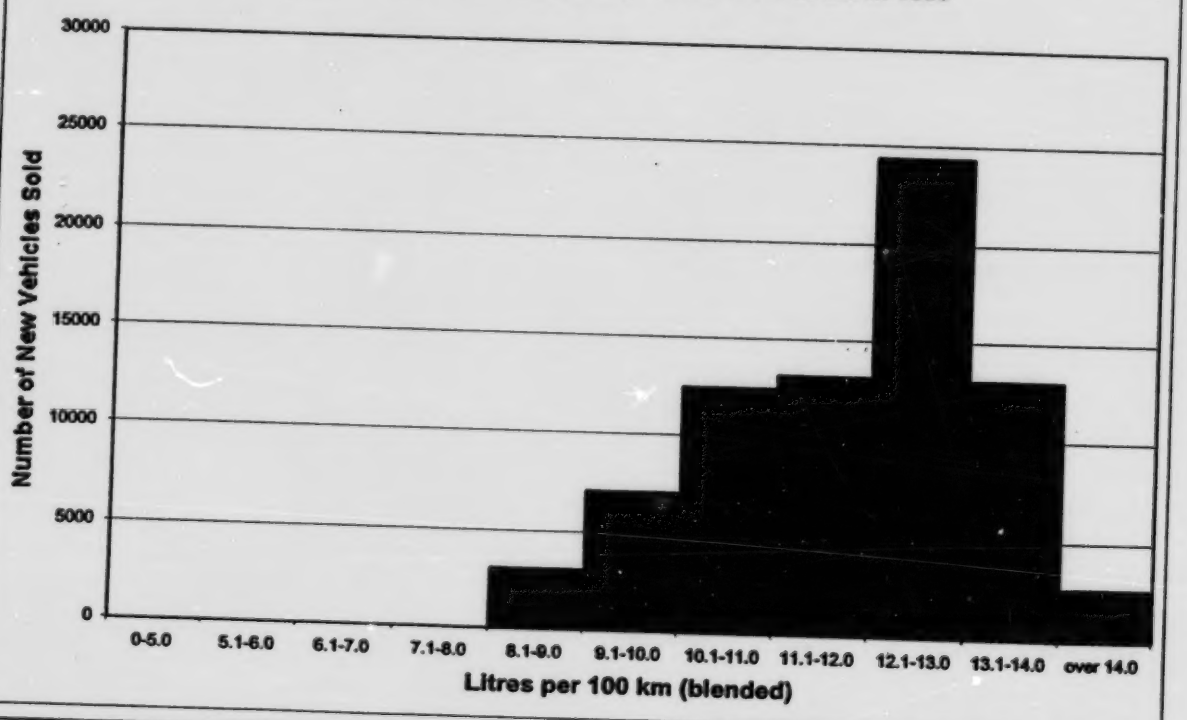



Source: 2000 DesRosiers Automotive Yearbook

**Figure 4**
**Fuel Efficiency of New Cars Sold in BC in 1999**




**Fuel Efficiency of New Light Duty Trucks Sold in BC in 1999**



## Types of Government Measures

There are several ways for government to intervene to try to change behaviour and achieve an objective, such as reducing GHG emissions. The three most common methods are:

- regulatory measures, where government uses its law making powers to require that something be done or not be done, and to establish the consequences if the requirement is not met. There are two broad types of regulatory requirements: command and control regulation which specifies what must be done; and standards or outcome based regulatory requirements that specify what must be achieved, but provide discretion about how to meet the standard;
- economic incentives, where government uses its fiscal powers to affect prices in the marketplace. All tax shift initiatives include economic incentives; and
- voluntary measures, where government agrees to allow industry to try to deal with a problem without other government intervention.

Traditionally, governments have often used regulatory measures to achieve objectives, such as dealing with environmental issues or improving public health and safety. However, there has been a growing movement toward assessing the relative environmental benefits and economic costs of various alternative approaches to try to maximize the benefit and minimize the economic cost. Some believe that, in general terms, command and control measures have the greatest economic impact, followed by standards or outcome based regulatory measures, followed by economic incentives and voluntary measures. In fact, some argue, it is sometimes possible to design economic incentives that have net economic benefits, net social benefits and significant environmental benefits. However, even in such a win-win-win situation there will be individual winners and losers.

Others point out that measurement of the impacts of environmental measures in terms of economic cost and environmental benefit is often flawed and that economic benefits from changing behaviour to improve the environment, now and in the future, are often overlooked. However, there is not yet an accepted framework for fully evaluating the impact.

Tax shifts (discussed further in the following section) that combine an economic disincentive to undertake an environmentally damaging activity with a reduction in another tax have the potential to have a net beneficial economic impact as well as a beneficial environmental impact, depending on the specific measures chosen.

In British Columbia, there has been considerable interest in increasing the use of economic incentives instead of traditional regulatory measures, especially in the environmental area. This has lead to considerable work on tax shifting as a subset of economic measures. This discussion paper has been motivated, in part, by the fact that one particular type of economic incentive intended to reduce light duty motor vehicle GHG emissions, known as a "feebate," is often cited as a potential tax shift initiative. A feebate would apply a fee to new vehicles that are "gas guzzlers" and use the revenue to fund rebates for new vehicles that are "gas sippers." Feebates have been included in the options to be considered in this paper along with a wide range of other regulatory, economic incentive, voluntary and tax shift options.

## The Tax Shift Concept

The 2000 British Columbia provincial budget documents describe tax shift as:

> ... a market-based tool to encourage environmentally desirable behaviour and discourage behaviour which is harmful to the environment.

At its simplest, tax shift means shifting taxes away from productive activities, such as employment and investment, and towards those that waste natural resources or cause pollution. Fundamental to the concept of tax shift is that it should be:

- revenue neutral to government (i.e., all revenue raised as part of a tax shift should be fully offset by an equivalent reduction in other provincial taxes or fees, or by providing new incentives to encourage environmentally friendly behaviour); and

- the offsetting revenue reduction must be clear and transparent to the public.

The idea is that the incidence of the tax system can be shifted to provide desired incentives. One way to think of this is that the tax system can be used to correct so-called "market failures" so that more of the full cost of damage to the environment is captured in the cost of goods and services. This environmental impact is known as an "externality" and the tax increase portion of a tax shift would serve to "internalize" the externality. The result could potentially be a significant increase in revenue, which would be used to reduce other taxes which have a similar or greater economic impact so that the overall economic impact of the tax shift is a small cost or benefit. In addition, the social implications of the environmental tax increase, such as a disproportionate impact on low-income earners, for example, could also be offset by a reduction in another tax (see "Using Tax Shift to Offset Economic and Social Impacts").

Another way of thinking about tax shift is that, doing the "right thing" often costs more than doing the more environmentally damaging thing – tax shift can level that playing field by increasing the costs of environmentally damaging activities and reducing the cost of environmentally friendly activities.

Additional revenues from an environmentally motivated tax increase measure could also be used to fund incremental expenditure. However, this type of measure is not revenue neutral and is not usually considered to be a tax shift initiative.

## Using Tax Shift to Offset Economic and Social Impacts

As mentioned above, one of the features of the tax shift concept is that the economic and social implications of a tax increase imposed to discourage an environmentally damaging activity can be offset though reductions to other taxes. Often, the overall economic impact of a tax is measured in terms of economic efficiency, and one of the major social impacts of taxation is measured in terms of regressivity/progressivity, which are defined as:

- efficiency/inefficiency - the extent to which a tax interferes with the competitive price mechanism in allocating the economy's scarce resources; and

- regressivity/progressivity - the difference in the percentage of a person's income which is paid as tax at different income levels. A regressive tax is one where the tax as a percentage of income goes down as incomes increase. In contrast, a progressive tax is one where tax as a percentage of income increases with income. The personal income tax is an example of a progressive tax.

The issue of determining exactly how economically inefficient and regressive any given tax can be is quite complex and controversial. The following table ranks the various taxes in general terms on the basis of efficiency and regressivity. However, there are many specific features of a particular tax that can affect its efficiency and regressivity.

| Economic Efficiency | | Regressivity/Progressivity |
|---|---|---|
| Corporate Income Tax and Capital Tax | Least Efficient/Most Regressive | Specific Excise Tax (fuel, tobacco) |
| Personal Income Tax | ↓ | Conventional Sales Tax and Value Added Tax |
| Payroll Tax (EI Premiums) | ↓ | Payroll Tax |
| Specific Excise Tax (Fuel, Tobacco) | ↓ | Personal Income Tax |
| Conventional Sales Tax (PST) | ↓ | Corporate Income Tax and Capital Tax |
| Value Added Tax (GST) | Most Efficient/Least Regressive | |

This implies that one possible tax shift would be to use increased revenue from a source such as increased fuel taxes to reduce the provincial sales tax rate on the grounds that the PST and fuel tax are similar in terms of economic efficiency and regressivity. Alternatively, a tax shift could be designed to ensure an overall improvement in economic efficiency or regressivity. This could be done by reducing one or more other taxes (e.g. corporate income tax) or by changing the design of another tax, (e.g. personal income tax) to offset some of the effects of the increased fuel tax specifically. For example, the basic personal deduction could be increased as it relates to the provincial portion of the PIT or a provincial tax credit could be introduced to reflect the average increase in fuel taxes paid. Similar analysis can be done to evaluate tax shift options related to other revenue increases resulting from environmental measures.

The following table outlines the relative revenue impacts of various tax changes for Fiscal Year 2000/01. This provides an idea of how a given revenue increase could be applied in a tax shift. For illustration purposes, the various tax change possibilities are presented in terms of total revenue impact and in terms of cents per litre of fuel tax.

| Tax Change | Revenue Impact ($ million) | Revenue Impact (Cents of Fuel Tax) |
|---|---|---|
| Increase Clear Fuel Tax by 1¢ per litre | 59 | 1.0 |
| Reduce general (not small business) CIT rate by one percentage point | -60 | 1.0 |
| Reduce Corporation Capital Tax rate for general corporations from 0.30 to 0.27 percent | -36 | 0.6 |
| Eliminate Corporation Capital Tax for general corporations | -380 | 6.4 |
| Reduce general sales tax rate (excluding liquor) by one percentage point | -430 | 7.3 |
| Eliminate sales tax on machinery and equipment | -120 to -140 | 2.0 to 2.4 |
| Increase the basic personal income tax credit amount to $8,500 | -75 | 2.3 |
| Reduce all PIT rates by one percentage point | -470 | 8.0 |

Source: Ministry of Finance and Corporate Relations

### The Effectiveness of Economic Incentives

The effectiveness of economic incentives in achieving environmental objectives depends on how well the economy responds to changes in cost. This is measured by a concept known as "elasticity" which measures sensitivity to changes in economic parameters such as price and income. This is discussed further in Appendix C, which provides some estimates of elasticities related to vehicle purchase and use. That discussion points out that elasticity estimates vary considerably and there is no easy way to determine which estimates are more accurate or more likely to be reasonable estimates in current and future markets in British Columbia.

## *Relevant Programs, Processes and Activities*

There are a number of programs in place in British Columbia and elsewhere and a number of consultation exercises that are relevant to the subject of this paper. Appendix C provides some additional information about the set of programs listed below.

The following list demonstrates that this is a complex area in which there are many existing and proposed programs, measures and activities that have to be taken into account whenever further change is considered. New or changed measures need to be considered not only in terms of their own impacts but also in terms of their cumulative impacts on related programs and measures.

## Policies and Programs

The following are federal, provincial and local government policies and programs currently in place that directly affect light duty vehicle emissions:[16]

- New Vehicle CAC Emission Standards – provincial and federal;
- Fuel Quality Standards – provincial and federal;
- Scrap-It Program – provincial, administered by ICBC;
- AirCare Program – Lower Fraser Valley, administered by TransLink;
- Alternative Fuel Vehicle PST Policy - provincial;
- Alternative Motor Fuel Tax Policy – provincial; and
- High Occupancy Vehicle (HOV) Lanes – provincial and local.

The following programs and policies do not have a direct impact on light duty vehicle emissions but are relevant to the subject of this paper:

- GHG Emission Reduction Trading Pilot;
- Luxury Tax (higher provincial sales tax on new vehicles over $32,000) – provincial; and
- Motor Fuel Tax – federal, provincial (including BC Ferries, BC Transit and the BC Transportation Financing Authority) and local (TransLink, and BC Transit in the Capital Regional District).

## Relevant Consultation Processes

The following consultation processes are underway:

- National Climate Change Process;
- BC Greenhouse Gas Forum; and
- BC Cleaner Technology Vehicles Committee.

## Government Measures under Consideration

The following measures have been announced as being under consideration or development and, if implemented, may have an impact on light duty vehicle emissions:

- ICBC incentives to promote new vehicle technology;
- ICBC and TransLink transportation demand management measures;

[16] It should be noted that these programs are primarily directed towards CAC emissions and generally have modest impacts on GHG emissions. Fuel standards do not likely increase fuel efficiency, Scrap-It and AirCare have positive but modest impacts, alternative fuels may directly increase fuel efficiency but there are ongoing debates about their lifecycle GHG emission impacts and many consider HOV lanes to be ineffective from an environmental perspective.

- ICBC Intelligent transportation systems to collect information and facilitate sophisticated pricing of insurance, license fees and road taxes;
- Access to HOV lanes for new technology vehicles;
- TransLink vehicle levy;
- BC Green Government initiative, including vehicle fleets and employee commuting; and
- BC Transportation Awareness program.

### Government Measures in Other Jurisdictions

The following are some of the relevant measures in place in other jurisdictions:

- Fuel economy standards in the United States, Canada and the European Union;
- Feebate measures in Austria, Ontario, and proposed in Vermont;
- Tax credits for low emission vehicles in the United States and China;
- Increased fuel taxes in Europe;
- Parking policy in Maryland;
- Rideshare policy in Washington State;
- Subsidies for vehicle repair and scrappage in California; and
- Luxury taxes in Australia, Denmark, Italy and the United States.

### Automobile Industry Activities

Relevant industry activities include:

- Development and introduction of pollution control technology;
- Improvements in fuel efficiency;
- Efforts to encourage the petroleum industry to improve fuel quality or governments to require stricter fuel quality standards; and
- Public education.

# Objectives and Evaluation Criteria

The purpose of this section is to provide a basis for the comparison of the various options.

One obvious way to compare options is to consider how well each option would achieve the objective that has been established. In this case, there is a certain amount of controversy associated with the specific objective that should be used for this purpose. This issue is discussed and an objective proposed below.

In addition, government measures always have a wide range of effects and implications beyond their contribution to achieving a stated objective. These include economic and social implications, the degree of uncertainty associated with the option and how acceptable the measure might be to the public. This section also discusses how the options might be evaluated in these respects as well. Together these factors can be considered as elements of the "doability" of an option. The most doable options are those that make a significant contribution toward the environmental objective while having low negative economic and social implications or economic and social benefits are relatively certain and are likely to be acceptable to the public. Of course, this ideal is seldom possible and there are almost always tradeoffs that need to be made in setting public policy.

The intention of this paper is not to evaluate fully or rank the various options but rather to discuss the factors and implications that should be considered when evaluating the options, as background to further discussions and consultations. By discussing each of these factors of doability, a sense can be developed of the tradeoffs associated with each option.

## *The Environmental Objective*

The Terms of Reference indicate the objective is "to reduce greenhouse gases and emissions related to motor vehicle (passenger vehicle and light truck) use in British Columbia." In other words, the measures should be directed to both climate change and air quality issues but limited to measures that directly affect the contribution of light duty motor vehicles to those environmental issues.

As indicated, light duty motor vehicles contribute to both climate change and air quality issues. The discussion also shows that considerable attention has been paid to the issue of light duty motor vehicles' impact on air quality by industry and government, and that further significant improvements are imminent. Climate change has received attention more recently and relatively less has been accomplished to date. However, the industry has indicated that the introduction of new technology for conventional vehicles and new propulsion technologies such as electric/fossil fuel powered hybrids and hydrogen fuel cell powered vehicles will improve fuel efficiency significantly over the next several years.

Some may ask why a distinction needs to be made between the impacts on climate change and the impacts on air quality because it seems logical that a policy which reduces one impact will also reduce the other. However, that is not necessarily so. Most of the technologies used to reduce CACs from light duty motor vehicles to date work by reducing the emissions per litre of fuel burned rather than by increasing fuel efficiency and therefore have had little effect on GHG emissions. Some have even reduced fuel efficiency.

For the purpose of this discussion paper:

**The environmental objective is to reduce GHG emissions from light duty motor vehicles, but not at the expense of increased CAC emissions (air pollution), and those measures that reduce GHG emissions and also improve air quality should be favoured.**

## *Economic Implications*

Most types of government activity have an impact on the economy, either positive or negative. Ultimately the economic impact of government measures is usually measured in terms of the impact on the total income earned in the economy in a given period, usually referred to as the Gross Domestic Product (GDP). These impacts work by affecting economic efficiency or by directly affecting the size of the economy, which includes the public sector (government activity). A government measure can affect economic efficiency by reducing or increasing the costs of various players in the economy, including raw material producers, manufacturers, wholesalers, retailers and consumers. In addition to affecting private sector economic activity, government measures that have fiscal implications due to increased or decreased government revenue or expenditure also have direct effects on GDP.

One of the ways that government measures have an economic effect is through administrative costs. These costs can be separated into costs borne by government to undertake any required program administration and costs borne mostly by the private sector in terms of the effort needed to comply with the government's administrative requirements, known as compliance costs.

Usually government measures implemented to achieve environmental objectives have macroeconomic implications (i.e. affect GDP). The cost of a given improvement in environmental quality can vary considerably depending on the method chosen to generate the environmental impact. There can also be macro-economic benefits as a result of environmental measures, when the result is that environmental industries are enhanced, creating jobs and exports or when they lead to a reduction in the consumption of goods that are primarily imported, such as fuel. Another type of economic implication of government measures has to do with how the measure affects different firms and individuals. Inevitably the impact of government measures will create a greater burden or benefit for some than others. Examples include differing regional impacts or differing impacts on importers and domestic producers within an industry. Unlike macroeconomic costs or benefits, it is not always clear what distribution of economic costs or benefits is best. However, it is important to understand what the distribution is likely to be. In particular, the impact on business will be discussed for each option.

Government measures can also have an economic impact by influencing prices and therefore inflation.

For each of the options examined the economic implications are discussed in terms of the impacts on the overall economy (macroeconomic impact), the impact on business (including compliance costs), other distributional impacts (such as regional impacts), the fiscal impact (including administrative costs) and the inflationary impact.

### Social Implications

Government measures also have social implications. These include implications for individuals who are disadvantaged and implications for quality of life. For example, the degree to which a particular measure will impact low-income earners (the progressivity or regressivity of the measure) is an important social implication. Other social implications related to measures that affect light duty motor vehicles include public health and safety, road congestion, urban sprawl and consumer choice. For each option, these social implications will be discussed.

### Uncertainty

The degree of confidence in the type and magnitude of the implications of the various options is also an important consideration when comparing the options. Some of the options are measures that are already in place in British Columbia or elsewhere and that experience provides considerable confidence about the nature and magnitude of the implications. Other options have yet to be successfully implemented anywhere so the likely impacts are less well understood and the time and effort required to develop the measure fully and to implement it are likely to be longer. For each option the uncertainty associated with the option is discussed.

### Public Acceptability

This evaluation criterion is included because whether or not a measure can be successfully and sustainably introduced depends in part on how acceptable the measure is to the public. Strong resistance will make it difficult for the measure to be implemented or may result in the measure being withdrawn or changed after a short period of time. There are many factors that affect public acceptability. Among them are:

- whether the measure is understandable to the public;
- whether the measure is generally perceived to be fair and transparent;
- what costs the measure imposes, including both direct costs like increased taxes or fees and indirect costs like time needed to comply with a regulatory requirement; and
- what other similar costs are already imposed.[17]

It is not possible to evaluate fully the public acceptability of every option, but the factors associated with public acceptability will be discussed.

[17] The public may react not just to the incremental impact of a measure but to the cumulative impact of a set of measures.

# Options

There are a large number of ways that the British Columbia government could take action to achieve the environmental objective. In general, these measures would all work by either increasing fuel efficiency of light duty motor vehicles in British Columbia or by reducing the total vehicle distance traveled, or both. The following is a list of options considered:

1. **Status Quo** – no changes at this time.

**OPTIONSTO IMPROVE THE FUEL EFFICIENCY OF THE VEHICLE FLEET**

2. to 6. **Vehicle Feebates** – revenue-neutral economic incentive to purchase vehicles that are more fuel efficient;
7. **Annual Vehicle License Feebate** – revenue-neutral change in annual vehicle license fees to reward more fuel efficient vehicles and impose higher annual costs on less fuel efficient vehicles;
8. **Fuel Efficiency Standards** – regulatory requirements for fuel efficiency of new vehicles;
9. **Voluntary Fuel Efficiency Measures** – agreement with industry to work voluntarily to increase fuel efficiency;
10. **Fuel Quality Standards** – enhanced fuel quality regulatory requirements;
11. **Fuel Quality Tax Measure** – tax incentive to encourage the purchase of higher quality fuel as enhanced fuel quality standards are phased in;
12. **Enhanced Scrap-It Program** – enhanced incentives to scrap older vehicles;
13. **Enhanced AirCare Program** – increased emphasis within the vehicle inspection and maintenance program in the Lower Fraser Valley on fuel efficiency with the possibility of expanding the program geographically; and
14. **Public Education Regarding Fuel Efficiency** – raising public awareness of the environmental implications of fuel efficiency and ways to increase fuel efficiency.

**OPTIONS TO REDUCE TOTAL VEHICLE DISTANCE TRAVELED**

15. **Distance Based Insurance** – conversion of a fixed cost of vehicle operation to a variable cost, providing an incentive to reduce vehicle distance traveled;
16. **Tax Shift to Increased Variable Vehicle License and Other Government Fees** – conversion of a fixed cost of vehicle operation to a variable cost, providing an incentive to reduce vehicle distance traveled;
17. **Tax Shift to Road Tolls** – revenue neutral introduction of a comprehensive set of road tolls in urban areas and main highways designed to increase the cost per kilometre driven and reduce congestion; and
18. **Parking Policy** – economic and supply management changes to provide incentives to reduce vehicle trips taken.

**OPTIONS TO BOTH INCREASE FUEL EFFICIENCY AND REDUCE VEHICLE DISTANCE**

19. **Tax Shift to Fuel Tax** – revenue neutral economic incentive to reduce vehicle distance and indirectly, to shift consumers to more fuel efficient vehicles by increasing fuel tax and reducing another revenue source;

20. **Tax Shift to Fuel Tax if Fuel Prices Fall** – fuel taxes would be increased in a revenue neutral manner if fuel prices fall below a specified level to maintain part of the GHG reduction impacts of current high fuel prices;

21. **Emission Capping and Trading** – allocating a tradable emission allocation to individuals; and

22. **Combination of Options** – undertaking more than one option, such as combining the Annual Vehicle License Feebate, Enhanced Scrap-It Program, Enhanced AirCare Program, Public Education and Distance Based Insurance.

Even though this list includes 22 different options it is not comprehensive. There are options that have not been considered, either because they have not been raised as serious options by the participants or because they are clearly not feasible. One such option would be to ban certain vehicles from being sold in British Columbia based on their fuel efficiency or other characteristics. Although approaches such as this under which government imposes limitations on consumer choice are technically possible, they would clearly be unacceptable to the public, the business community and the government, and have not been considered in this discussion paper.

# 1. Status Quo

Under this option, government would not take any further action to reduce British Columbia light duty motor vehicle GHG emissions at this time. There are a number of reasons why government might choose to take this approach.

The government may feel that the climate change issue is a global problem that is best addressed at the national and international level first because any changes that a relatively small jurisdiction like British Columbia unilaterally makes in one GHG emission subsector like light duty motor vehicles would have such a small impact on the overall problem that the effect would not be measurable.[18] Rather, the government would work to encourage the federal government to take action and to work constructively towards effective international action, with the intention of implementing complementary provincial programs as the federal government takes action. The federal government has announced a GHG action plan that may provide the basis for such an approach.

Alternatively, the government might feel that it is important for the province to show leadership and to act locally on the climate change issue even if the provincial government measures have only a small overall impact to encourage others to act also. Nevertheless, they might choose to

[18] Note that the British Columbia light duty motor vehicle sector produces about 17% of British Columbia GHG emissions which are about 9% of Canadian GHG emissions which are less than 2% of world GHG emissions, so a 10% reduction in British Columbia light duty motor vehicle emissions would be a 0.003% (3 one thousandths of one percent) reduction in world GHG emissions.

make no change in respect of light duty motor vehicle GHG emissions until they have a set of measures ready which would deal with all of the various sectors that produce GHG emissions.

Alternatively, the government may feel that light duty motor vehicles should be addressed first because of their visibility and the effect that would have on raising the profile of the climate change issue. However, the government might feel that the current increases in fuel prices, if sustained, would be more effective than any unilateral provincial government measure in addressing light duty motor vehicle GHG emissions and that further government action is unnecessary unless fuel prices begin to fall sharply. Between March 1999 and July 2000, the gasoline component of the Consumer Price Index for British Columbia increased by 53.8% and prices have continued to increase since that time so that they are now at or close to 80¢ per litre. Using a long term price elasticity of -0.6, which is generally believed to be a conservative estimate of the impact of a change in prices felt throughout North America, fuel used and light duty motor vehicle GHG emissions should decrease by at least 30% from current levels over the next five years, unless prices fall. The government could even enact legislation that would automatically take effect if and when fuel prices decrease to preserve some of the impact of currently high fuel prices on light duty motor vehicle GHG emissions (see "20. Tax Shift to Fuel Taxes if Fuel Prices Fall").

Finally, the government may feel that the public does not yet perceive climate change to be a significant enough issue to justify any cost or inconvenience. However, that may be more of an argument for the Public Education option than for the Status Quo option.

Unlike the other options, the specific implications of this option have not been analyzed because the implications of the other options are discussed in terms of their implications compared with the business as usual, status quo baseline.

# Options to Increase Fleet Fuel Efficiency

## *2. to 6. Vehicle Feebates*

"Vehicle feebate" is defined, in essence, as a program under which purchasers of vehicles with lower than average fuel efficiency pay a fee and those with higher than average fuel efficiency receive a rebate. The program would work by providing consumers with an economic incentive to purchase a more fuel efficient vehicle.

In theory, a vehicle feebate would improve fuel efficiency by:

- directly impacting the choice of consumers and therefore the mix of vehicles in the vehicle fleet; and
- indirectly influencing manufacturers to the extent that the change in consumer behaviour would induce manufacturers to increase vehicle fuel efficiency.

However, since the British Columbia market for new vehicles is less than one percent of the North American new vehicle market, it is unlikely that there would be any direct detectable influence from a British Columbia only feebate on vehicle manufacturers. On the other hand, introduction of a fully functional feebate in British Columbia could act as a precedent which might encourage similar measures to be introduced in other jurisdictions which might eventually begin to affect manufacturers' behaviour.

Within the general feebate concept, there are many ways that a specific program could be designed. Some of the issues that would need to be addressed in designing a specific feebate include:

- What vehicles would be covered? (e.g. all up to certain GVW? non-commercial only? new and used?)
- Would the program be revenue neutral?
- How high would the maximum fee and rebate be?
- What would be the factor that would determine the level of the fee/rebate (e.g. fuel efficiency ratings, a combination of fuel efficiency and pollution emission ratings or some other basis)?
- Would there be one fee schedule for all light duty motor vehicles or different schedules for different classes of vehicles?
- How would fees and rebates be administered?
- Would the current luxury tax be changed or eliminated?
- Would the feebate be implemented without advance notice to minimize perverse effects[19] or some time after it was announced to allow for a smooth introduction (e.g. to minimize compliance costs to automobile dealers and to allow them to adjust the mix of vehicles ordered)?
- How would border issues be dealt with to prevent importation of vehicles to avoid the feebate?
- Would PST apply to the fee or rebate? Under current federal legislation, GST would apply to the fee but the rebate would not reduce the GST payable.
- How would the current $500 rebate for alternative fuel vehicles be incorporated into the feebate?
- Would the program design affect whether or not the fee portion of the feebate could be included in the cost of the vehicle for leasing/financing purposes?
- How would a feebate affect other government revenue sources, such as PST?

Given the various design issues, five different feebate options are discussed.

## 2. Standard Feebate for New Vehicles

As a point of reference, the following is somewhat arbitrarily designated as the "standard feebate" program. This is not because it is necessarily better than any other feebate program design but because it seems to be what most people imagine a feebate program might be like:

- the feebate would apply to all new light duty motor vehicle sales, with light duty motor vehicles defined to include passenger automobiles, light duty trucks, vans and SUVs. New

[19] Such effects might include buying gas guzzlers in advance to avoid the fee and delaying the purchase of gas sippers to obtain the rebate.

vehicles would be defined to ensure the program could not be circumvented by bringing new vehicles in from other jurisdictions and selling them in British Columbia as used vehicles;

- the maximum fee would be about $4,000;[20]
- a fee would apply to any vehicle with an NRCan fuel efficiency rating in terms of litres per 100 kilometres of blended city-highway driving that is higher than the median fuel efficiency of vehicles sold in British Columbia in the previous year.[21] This would include factory manufactured alternative fuel vehicles (e.g. vehicles powered by propane, natural gas, etc.);
- the amount of the fee for a specific vehicle would be proportional to the vehicle's fuel efficiency. A fee schedule table would be produced providing fees at 0.2 litres per 100 kilometre increments;
- the rebate schedule would be determined by forecasting the amount of fees to be paid, deducting expected administration costs and deriving a rebate schedule which would distribute the rebate pool over forecast purchases of vehicles that are more fuel efficient than the median vehicle;
- fee and rebate schedules would be adjusted each year based on the previous year's results and a forecast of the next year's sales so that, over time, the program is revenue neutral;
- the fee and rebate schedules would be developed by an independent agency empowered to set the fee and rebate schedules to ensure that changes are made annually and that the program is transparently revenue neutral. A trust fund could be established which receives fees and dispenses rebates and administrative costs so that the program is removed from the government fiscal structure;
- fees and rebates would be collected/paid at the time of purchase through the same administrative mechanism as the collection of the provincial sales tax; and
- there would be no change to the luxury tax. That is, the luxury tax would continue to apply as it is currently designed. Buyers of relatively fuel inefficient vehicles costing more than the luxury tax's $32,000 threshold would pay both.

Note there is no connection between the feebate and the usage of the vehicle or actual GHG emissions.

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[20] What should the maximum fee be? One approach would be to apply economic principles. From an economic perspective, the purpose of a feebate would be to correct a market failure caused by the fact that the price of vehicles does not capture the full costs imposed by vehicles because the costs imposed by emissions are not included. This is known as an "externality" and the fee would "internalize" the externality. Therefore, the maximum fee should be set equal to the economic cost of the emissions produced by the vehicle. One study (see Natural Resources Canada, Assessment of a Feebate Scheme for Canada, Final Report, June, 1999.) of feebate estimated that this amount would be about $4,000. Undertaking a defensible estimate of the externality is not a trivial matter and would invariably include a certain amount of judgement.

Another approach would be to use the price elasticity of demand for vehicles to calculate the fee required to generate a specific reduction in GHG emissions, if such a target were available. This is a calculation that is feasible but also not trivial and, as discussed in the section on the effectiveness of economic measures, estimates of elasticities are not always reliable. This approach would also require a specific emission reduction target.

[21] This measure of fuel efficiency may require refinement to produce defensible fuel efficiency ratings for all vehicles.

The following table provides an example of a feebate schedule under this option, based on 1999 sales data and without making any allocation for administration costs. Note that under this example, 92 percent of the rebates would be paid to purchasers of passenger cars and 97 percent of fees would be paid by purchases of light duty trucks.

**Table 4 – Standard Feebate Illustrative Example**

| Fuel Efficiency (litres per 100 kms hwy) | Fee | Rebate | Approx. Number of Vehicles | Approx. Number of Cars | Approx. Number of Light Trucks | Revenue | Rebate Payment |
|---|---|---|---|---|---|---|---|
| <5.0 | | $4,000 | 2,000 | 2,000 | 0 | | $8 million |
| 5.0-5.9 | | $2,000 | 14,000 | 14,000 | 0 | | $28 million |
| 6.0-6.9 | | $800 | 21,000 | 21,000 | 0 | | $16.8 million |
| 7.0-7.9 | | $500 | 33,000 | 28,000 | 5,000 | | $16.5 million |
| 8.0-8.9 | $0 | | 21,000 | 4,000 | 17,000 | | |
| 9.0-9.9 | $500 | | 12,000 | 1,000 | 11,000 | $6 million | |
| 10.0-10.9 | $1,000 | | 27,000 | 0 | 27,000 | $27 million | |
| 11.0-12.0 | $2,000 | | 14,000 | 0 | 14,000 | $28 million | |
| >12.0 | $4,000 | | 2,000 | 0 | 2,000 | $8 million | |
| | | **TOTAL** | **146,000** | **70,000** | **76,000** | **$69 million** | **$69.3 million** |

Environmental Objective

The feebate described above would reduce GHG emissions in British Columbia by changing the mix of new vehicles sold. Since new vehicle sales account for only about 6.4 percent of the vehicle fleet in British Columbia and less than 10 percent across North America, the impact will be realized over time. Estimates of the effectiveness of feebate programs similar to the one described above have put potential GHG emission reductions in the range of 2 to 3 percent of light duty motor vehicle emissions over 20 years from changing the mix of vehicles sold.[22, 23]

A feebate program would serve to raise the profile of the climate change issue and educate the public about fuel efficiency.

Such a feebate would also have an impact on the used vehicle market. It would increase the price of inefficient used vehicles (because they present an alternative to purchasing a new

[22] Apogee Research International, Ltd., A Policy Instruments Working Paper on Reducing Carbon Dioxide Emissions from the Transportation Sector in Ontario, November, 1995 (www.web.net/ortee/transportation/report9/)

[23] Natural Resources Canada, Assessment of a Feebate Scheme for Canada, Final Report, June, 1999.

vehicle that would attract a fee), and would reduce the price of efficient used vehicles. It is unclear what the net impact of the effect on the used vehicle market would be on GHG emissions. The effect would:

- reduce the turnover rate for older inefficient vehicles and increase the turnover rate for older efficient vehicles, reducing the overall GHG emission impact; and
- encourage used vehicle buyers to buy more efficient used vehicles, enhancing the GHG emission impact.

The feebate program would not directly affect CAC emissions because all new vehicles emit about the same amount of CAC pollution per kilometre, but would indirectly increase CAC pollution emissions slightly because increased fuel efficiency also acts as an incentive to drive more (sometimes referred to as the "take back effect") and the resulting increase in total vehicle distance traveled would increase CAC pollution emissions. In addition, the impact of the feebate on the used vehicle market would also have an impact on air quality but it is unclear whether the net impact would be positive or negative.

Economic Implications

There would be an economic cost associated with the program to the extent that using the program to cover its administrative costs represents an overall tax increase and that compliance costs create economic inefficiencies. The magnitude of that impact depends on the size of the administrative and compliance costs, which have not been estimated.

Administrative costs would also have a small impact on overall vehicle prices to the extent that fees outweigh rebates, which would serve to increase overall vehicle prices and therefore inflation.

By definition, so long as the measure is revenue neutral there would be no net fiscal impact to government.

There would be several impacts on business. The feebate is expected to have a greater impact on domestic light duty motor vehicle manufacturers than on importers because the products of importers are on average more fuel efficient than the products of domestic manufacturers. That would have little direct impact on the British Columbia economy since there is no light duty motor vehicle manufacturing in the province. However, there would be a negative impact on automobile dealers because the feebate would reduce overall new vehicle revenues.[24] The size of the impact on specific dealers would vary with the product mix sold.

There may also be regional impacts since a greater proportion of vehicle purchasers outside major urban areas may require larger vehicles for work or safety reasons. Some argue that there are already relatively fuel efficient alternatives available for these people and that recent announcements by manufacturers about fuel efficient trucks, vans and SUV products to be released in the next few years mitigate this concern.

[24] Natural Resources Canada, Assessment of a Feebate Scheme for Canada, Final Report, June, 1999.

Social Implications

The program would not be regressive since the most inexpensive new and used vehicles are also among the more fuel efficient vehicles and the cost of both would be reduced as a result of the feebate. However, there may be distributional impacts on larger families that need larger and less fuel efficient vehicles. Some point out that large families make up only a small proportion of the population.

Feebate may have a negative impact on the physically challenged who require larger, specialized vehicles for access.

The feebate would not directly limit consumer choice – it would simply affect vehicle prices.

Due to the takeback effect, the feebate would result in some increase in total vehicle distance traveled, which in turn, would have social implications in terms of increased congestion and reduced traffic safety, although this impact is not expected to be significant.[25] To the extent that the feebate increases CAC pollution emissions, there would be negative public health implications.

Uncertainty

There is some uncertainty associated with the standard feebate option. Although such a program is not in place in any jurisdiction, a somewhat similar program is in place in Ontario and feebates have been under careful scrutiny in many jurisdictions for several years, leading to considerable discussion in the literature. As indicated above, there are a considerable number of issues that would need to be addressed in designing the detailed program.

Acceptability Implications

There are two different views about how acceptable such a program would be. Some believe that the program would be intuitively attractive and perceived as fair and understandable by most consumers. Others feel that it would be perceived as very unfair by all of those having to pay a fee, those who see the value of their used vehicle drop or those who see the cost of a used vehicle purchase increase, which could generate significant consumer resistance. It remains to be seen which view is more accurate.

Although the annual adjustments to the program would be somewhat complex, the actual amount of the fee and rebate faced by the consumer would be quite straight-forward.

By creating an independent mechanism to adjust rates annually and a trust fund to keep revenues separate from government finances, it may be possible to reduce public concerns that the program is really a revenue generating mechanism rather than a revenue neutral environmental program, but there would likely be a certain amount of skepticism about revenue neutrality regardless of how the program was designed.

[25] As discussed in Appendix C, the take-back effect is estimated to be between 10 and 40% of the primary impact of increased fuel efficiency. Because the direct impact of the feebate on fuel efficiency would be relatively modest it follows that the take-back effect would not be significant.

The program may raise public objections from those who will have to pay both a significant fee and the luxury tax. The fee portion of the program may be perceived as a significant incremental cost to vehicle ownership imposed by government on top of already significant government imposed costs.

### 3. Feebate for New and Used Vehicles

This option would be a variation of the "Standard Feebate" program by applying feebates to all vehicle sales, not just new vehicle sales. By applying the feebate program to all vehicle sales, the concern about the impact of the standard feebate program on the turnover rate would be eliminated and the program would act as an incentive to scrap older vehicles.

There would be considerable and possibly insurmountable administrative hurdles to such a program in terms of developing and maintaining a database of fuel efficiency ratings for all vehicles. There is also a significant issue related to whether it would be fair to base used vehicle feebates on original fuel efficiency ratings given changes that may been made to the vehicle and the impact on how the vehicle has been operated and maintained on its actual fuel efficiency.

#### Environmental Objectives

This type of program would have significantly higher reductions in GHG emissions than the standard program and would have more immediate impacts. There is no known source for an estimate of the amount British Columbia GHG emissions from light duty motor vehicles would be reduced, but if the number of used vehicles sold is about 3.3 times the number of new vehicle sold,[26] the impact could be in the range of 6.6 to 9.9 percent (based on simple multiplication).

By eliminating older, more polluting vehicles, this program would increase the turnover rate of the fleet and thereby reduce CAC pollution emissions.

#### Economic Implications

This type of feebate program would have significantly higher costs of administration and compliance since it would apply to a much larger number of transactions. As a result, both the economic costs and the impact on inflation would be higher than for the standard program.

The business implications would be similar to those expected from the standard program but more pronounced for the automobile dealers.

#### Social Implications

Social Implications would be similar to the standard program but more pronounced due to the expanded scope of the program.

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[26] In order of magnitude terms, there are about 150,000 new vehicles sold and about 500,000 used vehicles sold annually, according to the BC Automobile Dealers Association.

Uncertainty

This type of feebate program has not been implemented in any jurisdiction and there is no known mention of this type of program in the literature. Therefore, it would have a higher degree of uncertainty associated with it than the standard feebate. One particular source of uncertainty is the issue of whether fuel efficiency ratings or an acceptable and fair proxy could be generated for all light duty motor vehicles.

Acceptability Implications

The administrative issues associated with applying a feebate to used vehicle sales would make the program significantly more complex from the perspective of the consumer than the standard program. That may make the program difficult or impossible to implement.

Other acceptability concerns are expected to be similar to the standard program.

## 4. Feebate for Classes of Vehicles

The usual feebate concept would apply across the whole range of vehicles. One problem with that is that consumers purchase vehicles based on a lot of factors, not just price. Most consumers want a vehicle that meets a certain set of requirements for business purposes or for comfort, safety, prestige, capacity, etc. The fuel efficiency difference among vehicles that meet the consumers' needs may be small, so that for consumers who are unwilling to compromise on their set of needs, the feebate will have little effect.

An alternative would be to classify vehicles by type and operate feebate programs for each vehicle type, providing a much larger incentive to improve within a class. There are two problems with this approach. One is that different consumers have different sets of requirements, so there is no simple or effective way to classify vehicles. The other problem is that using vehicle classes would create a disincentive to move from one class of vehicles to another. Consider the example set out in the following table, based roughly on 1999 sales. In the example there are two classes of vehicles – passenger automobiles and light duty trucks. In the example, a passenger automobile with a fuel efficiency rating of 8 litres per 100 kilometres would attract a $500 fee while an SUV with the same fuel efficiency would attract a $600 rebate.

Most believe that this perverse effect of encouraging some people to move to less fuel efficient classes of vehicles would make a program based on vehicle classes unacceptable. Others argue that this shows that it would be difficult or impossible to design a really effective feebate program since the across-the-board program would have little effect on most purchase decisions, except to delay some purchases, and a program applied to classes would be more effective but practically may be unacceptable to the public.

Environmental Objective

It is likely that the perverse incentive to move to less fuel efficient vehicles that would attract a rebate would make this option less effective in reducing GHGs than the standard feebate (i.e. less than 2.5 percent of British Columbia light duty motor vehicle GHG emissions), but there is no known source for an estimate of effectiveness. The effect on CAC pollution emissions would be similar to the standard feebate option.

**Table 6 – Feebate for Vehicle Classes: Illustrative Example**

| Fuel Efficiency (litres per 100 km highway) | Fee | Rebate | Approx. Number of Vehicles | Revenue | Rebate Payment |
|---|---|---|---|---|---|
| **Schedule for Passenger Automobiles** | | | | | |
| <4.0 | | $1,000 | 0 | | $0 |
| 4.0-5.5 | | $500 | 4,000 | | $2 million |
| 5.5-6.5 | | $250 | 25,000 | | $6 million |
| 6.5-7.5 | $0 | $0 | 27,000 | | |
| 7.5-8.5 | $500 | | 12,000 | $6 million | |
| 8.5-9.5 | $1,000 | | 2,000 | $2 million | |
| >9.5 | $2,000 | | 0 | 0 | |
| | | | TOTAL | $8 million | $8 million |
| **Schedule for Light Duty Trucks** | | | | | |
| <6.0 | | $1,000 | 0 | | $0 |
| 6.0-8.5 | | $600 | 15,000 | | $9 million |
| 8.5-9.5 | | $300 | 14,000 | | $4 million |
| 9.5-10.5 | $0 | $0 | 31,000 | | $0 |
| 10.5-11.5 | $500 | | 9,000 | $5 million | |
| 11.5-12.5 | $1,000 | | 5,000 | $5 million | |
| >12.5 | $2,000 | | 2,000 | $4 million | |
| | | | TOTAL | $14 million | $13 million |

## Economic Implications

This option would be somewhat more complex than the standard option and would therefore likely have somewhat higher economic costs. Other economic impacts would be similar to the standard feebate option.

## Social Implications

Social implications would be about the same as for the standard feebate option.

## Uncertainty

This option would have about the same degree of uncertainty as the Standard Feebate option.

Acceptability Implications

The difficulty in establishing fair and effective vehicle classes and the perverse incentive effect would make this option less publicly acceptable than the standard feebate option.

## 5. Feebate to Replace the Luxury Tax

Instead of leaving the luxury tax in place when a feebate is introduced, the luxury tax could be reduced (by increasing the threshold at which it applies) or eliminated when the feebate is introduced.

Environmental Objectives

The luxury tax is quite strongly correlated with fuel efficiency so to the extent that it has any effect on consumer purchases, its reduction or elimination would reduce the impact on GHG emissions. However, the amount of the current impact is unclear. The GHG impact of this option is expected to be less than the Standard Feebate option (i.e. less than 2.5 percent of British Columbia light duty motor vehicle GHG emissions over 20 years).

Economic Implications

The impact of this option on economic activity would depend specifically on how it is handled. If the feebate were designed to generate net revenue to replace that foregone by reducing or eliminating the luxury tax, the economic impact would be about the same as the standard feebate option, as would the business impact.

If the government maintains the feebate program itself as revenue neutral and foregoes some or all of the revenue from the luxury tax, that would act to offset the economic cost imposed by the feebate and provide some additional economic stimulus, unless the revenue is replaced by an increase in another tax. Reduction or elimination of the Luxury Tax would act to offset the negative business impacts of the Standard Feebate.

Social Implications

The social implications would be about the same as for the standard feebate option.

Uncertainty

The uncertainty associated with this option would be about the same as the Standard Feebate.

Acceptability Implications

Replacement of the luxury tax with the feebate may make the feebate somewhat more publicly acceptable because there would be one less government charge applied to vehicles. However, that increase in acceptability would be offset if the feebate program were designed to replace the revenue from the luxury tax, since either more people would pay fees or people would pay higher fees than in the standard feebate case, and skepticism about revenue neutrality would be difficult to overcome.

### 6. High Efficiency Vehicle Feebate

Under this option, a small fee would be charged to most purchasers of new vehicles, with the proceeds used to fund significant rebates for very high fuel efficiency vehicles. Very high fuel efficiency vehicles might be defined as those with the ten percent highest fuel efficiency ratings, which would include hybrids and possibly factory manufactured alternative fuel vehicles. A possible justification is that new technology vehicles are more expensive than similar conventional vehicles, so the feebate would reduce the cost of "doing the right thing."[27]

Environmental Objective

This option would have a very small direct impact on GHG emissions, which would depend on the number of vehicles receiving rebates and the increase in sales resulting from the rebate. On the other hand, there would be some impact as a result of raising the profile of the issue. Although there is no known source for an impact estimate, because the impact would be significantly less than the Standard Feebate option, the impact is expected to be less than 1 percent of British Columbia light duty motor vehicle GHG emissions.

Economic Implications

There would be some cost of administration and cost of compliance. The absolute cost is unlikely to be large but could be significant compared to the environmental benefits.

The business impact would be small overall but manufacturers and dealers selling products that qualify for rebates would benefit disproportionately.

Social Implications

There would be no significant social implications.

Uncertainty

The uncertainty would be similar to the Standard Feebate option.

Public Acceptability

While the fee (likely under $50) applied to most purchases may be an irritant, it would be small in proportion to the purchase price.

### *7. Annual Vehicle License Feebate*

Under this option, the annual vehicle license fee would not be a flat rate for most vehicles, as it currently is, but would vary with the characteristics of the vehicle. The characteristic(s) used to determine the annual fee would be selected to vary with fuel efficiency, so that the fee would provide an incentive to move to a more fuel efficient vehicle. Characteristics that could be used

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[27] As discussed in Appendix A, there is already a $500 PST rebate for zero emission vehicles, hybrid and alternative fuel vehicles that would need to be coordinated with this measure.

as the basis for varying the fee include vehicle age, vehicle weight, engine displacement and the fuel efficiency rating of the vehicle when new.

In designing the specific fee schedule to be used, care would need to be taken to draw an appropriate balance between simplicity and effectiveness in achieving the objective. For example, while older vehicles tend to be generally less fuel efficient than newer vehicles there is a wide variation in fuel efficiency among vehicles in any given age group. Therefore, age alone would not be a very effective characteristic upon which to base the fee schedule. The same problem is true for weight and engine displacement. Together these variables might provide a better proxy for fuel efficiency, but a fee schedule based on three variables would be complex, adding administrative and compliance costs. The problems with the alternative of using the vehicle's fuel efficiency rating when new include:

- that the vehicle may no longer operate near its fuel efficiency rating due to maintenance and after-market changes; and
- there may not be fuel efficiency ratings available for all operating vehicles.

These problems are not insurmountable but would require careful consideration. TransLink has experienced similar problems in the design of its proposed vehicle levy.

The program would be revenue neutral in the sense that the total amount collected from the fee would be equivalent to the amount currently collected. This option is referred to as a "feebate" because it could be designed to charge relatively high fees to the least efficient vehicles in the fleet (i.e. older and heavier vehicles) and to charge no fees or provide a rebate to the most efficient vehicles. Since there is a need to collect net revenue equal to the current revenue collected, vehicles at or near the average fuel efficiency of the fleet would pay the same as the current license fee, about $60. As an example:

- the 20% of vehicles with the worst fuel efficiency could be charged an annual fee of about $180,
- the next 20% a fee of about $120,
- the next 20% a fee of $60,
- the next 20% no fee and
- the final (best) 20% receive a $60 rebate, resulting in revenue equal to charging $60 for all registered vehicles.

This option is an alternative to the Standard Feebate and is designed to address the same issues as the New and Used Vehicle Feebate option.

Environmental Objective

This option would provide an incentive to all vehicle owners to have a more fuel efficient vehicle and would tend to increase the scrappage and turnover rates. That should have an impact on both reducing GHG emissions and CAC emissions.

There is no known source for an estimate of the GHG impact from this option. The size of the impact would depend on the size of the variation in annual fees. However, it seems likely that the type of program described above, if administratively feasible, would be at least as effective

as the enhanced Scrap-it Program, AirCare Program or the New and Used Vehicle Feebate, with emissions reductions of 2 to 10 percent. [28]

Economic Implications

There should be no macroeconomic implications so long as the program is revenue neutral.

There may be some impact on business to the extent that businesses require heavier, less fuel efficient vehicles but there should be little impact on vehicle manufacturers or automobile dealers since the measure is unlikely to reduce vehicle sales.

So long as the information is readily available to calculate the fee for each vehicle automatically, there should be little administrative or compliance cost burden.

There should be little or no impact on vehicle prices and therefore no inflationary impact.

Social Implications

To the extent that this measure targets older vehicles, it may be seen to be regressive. However, there are more and less fuel efficient older vehicles so, unless the fee is based solely on vehicle age, low-income individuals should have alternatives available that attract low annual fees or rebates.

By encouraging older vehicles to be scrapped, there is likely to be an increase in public health and safety. Increased overall efficiency will encourage some increase in vehicle usage, having a negative impact on congestion.

Uncertainty

There are examples of jurisdictions that vary annual fees by vehicle age but no known examples of fees that vary by fuel efficiency, which would generate uncertainty. However, because this would be just an adjustment to the rate of an existing fee, there would be less uncertainty associated with it than with introducing a new program.

Public Acceptability

Public acceptability would likely depend mostly on whether this was perceived to be a fee increase or not and whether there was perceived to be a bias in the fee structure against areas outside of the Lower Mainland/southern Vancouver Island. In spite of revenue neutrality, those having to pay higher fees could generate considerable opposition to the measure. More complex fee structures may generate public resistance but resistance would also likely to be generated by simplistic fee structures that do not clearly target the environmental objective.

[28] To reach the high end of this range would likely require higher fees for inefficient vehicles than have been suggested in the example above.

## 8. Regulatory Fuel Efficiency Standards

As described in Appendix C, the United States CAFE standards operate by establishing average fuel efficiency requirements for the new vehicles sold by each manufacturer. The manufacturers have reacted to CAFE standards by increasing the average fuel efficiency of vehicles sold and by adjusting their marketing and pricing to ensure that the average fuel efficiency of vehicles sold is within the regulatory requirement. Canada has a harmonized counterpart known as CAFC, imposed through voluntary agreement with vehicle manufacturers.

British Columbia could implement its own CAFC standard that is more stringent than the current US standard. However, since British Columbia represents less than 1 percent of the North American market, such a regulatory requirement would result in little or no change in the fuel efficiency of vehicles produced by manufacturers. Rather, a made-in-British Columbia CAFC standard would likely result in certain vehicles not being made available in the British Columbia market and the pricing of other vehicles adjusted to ensure the average fuel efficiency of vehicles meets the regulatory requirement. However, it is not clear that manufacturers would be able to change prices for British Columbia significantly because of the ability of individuals to import vehicles from other jurisdictions, especially through use of the internet, unless there were strong measures taken to close the British Columbia border to vehicles purchased by British Columbians in other jurisdictions, which may or may not be practical.

If a made-in-British Columbia CAFC standard did have an effect, it would act much like a feebate and would increase the price (and/or reduce the availability) of less efficient vehicles and reduce the price of more efficient vehicles.

### Environmental Objective

The impact of a made-in-British Columbia CAFC standard on GHG emissions and CAC pollution emissions would be similar to the introduction of a feebate program. It would only affect new vehicles and therefore it would take a number of years for the full impact to be felt. There would be a take back effect as the increased fuel efficiency encouraged additional vehicle use, offsetting some of the benefit. The program would serve to increase the price of vehicles in British Columbia and the resulting increase in used vehicle prices might reduce the turnover rate, keeping older, dirtier and less fuel efficient vehicles on the road longer.

The Apogee Research study[29] estimated the impact to be 2 to 3 percent of provincial light duty motor vehicle emissions over 20 years.

### Economic Implications

There would be an economic cost from the program as a result of higher vehicle prices and manufacturers' compliance costs. There could also be significant administrative costs associated with trying to prevent the standard being circumvented by bringing in new or nearly new vehicles from other jurisdictions.

The business impact would primarily affect vehicle manufacturers and automobile dealers.

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[29] Apogee Research International, Ltd., Ibid.

Social Implications

The primary social implication would the reduction in consumer choice that would result from the standards being imposed.

In addition, the take back effect would result in the same negative social implications as the standard feebate program.

Uncertainty

Significant – no small jurisdiction has ever attempted to implement its own CAFC standards.

Acceptability Implications

Limitations in choice compared to other Canadian jurisdictions would likely make such a measure unacceptable to a significant proportion of the public.

## *9. Voluntary Fuel Efficiency Measures*

Industry has voluntarily undertaken initiatives to reduce GHG and CAC pollution emissions and argues that it will continue to do so.

One approach would be for government to enter into an agreement with industry that challenges it to meet a specified target for the average fuel efficiency of new vehicles sold on a voluntary basis, before proceeding with government requirements that may have higher economic costs. To be effective, such a program would require a specific goal and monitoring against that goal. The program would work, in part, through annual high profile publication of the average fuel efficiency of new vehicles sold by each manufacturer compared with the target, serving to raise the profile of the issue and provide an incentive for the industry to meet the target.

Alternatively, government could enter into an agreement with the industry that the industry would make the best available fuel efficiency technology available in the British Columbia market and make best efforts to meet market demand for more fuel efficient vehicles. The government *quid pro quo* might perhaps be government action to improve fuel quality further to ensure that the technology is effective (see the next two options and discussion about the implications of fuel quality for fuel efficiency under "Automobile Industry Actions" in Appendix C).

Some believe that voluntary measures are an industry delaying tactic that is ineffective in meeting environmental objectives and that government intervention is required to make any real progress in improving fleet fuel efficiency. Others suggest that voluntary measures can achieve similar results to a feebate or CAFE standard program in a small jurisdiction like a Canadian province with lower economic costs and are therefore worth at least trying. A voluntary program can be publicized, leading to benefits from raising the profile of the issue and helping to put pressure on other jurisdictions (such as the Canadian government and, through them, the United States government) for more effective continent-wide measures.

Environmental Objective

Such a measure would have some positive impact on the reduction of GHG emissions but the potential for reducing GHG emissions is uncertain. It may be that such an agreement could

have an impact that is close to the impact of a feebate or CAFC program or it may be that the result would be little or no change from the status quo and therefore no significant GHG effect.

Like the feebate or CAFC program, any effect would only be felt over time as the vehicles sold following introduction of the measure become an increasing proportion of the vehicle fleet. However, because the industry would have greater flexibility in how it responds to the measure, the impact on the used vehicle market should be less and therefore there should be a less adverse impact on the vehicle turnover rate.

There is no known source for an estimate of the impact, but if it was like the impact of a feebate, the impact would be up to 2.5 percent of light duty motor vehicle emissions over 20 years.

Like the feebate of CAFC program, there would be little impact on CAC emissions from a voluntary agreement.

Economic Implications

Because a voluntary agreement would provide industry with more flexibility in how it tries to increase vehicle efficiency and because there would be little administrative or compliance cost, the economic cost of such a program would be less than a feebate or CAFE program.

The business impact would depend on the nature of the voluntary measures.

There should be little or no impact on inflation and there are no obvious distributional implications such as regional inequities or domestic/import inequities.

Social Implications

The social implications would be similar to a feebate or CAFE program and proportional to the level of GHG emission reduction.

Uncertainty

Significant – there is no known model for such a voluntary agreement so the development of the measure would require significant effort on the part of government and industry.

Acceptability Implications

There do not seem to be any practical concerns that would make such a measure unacceptable to most people, since they would see little or no direct changes such as changes to tax, price or government administrative activity. Opponents, who view this type of measure as ineffective, may attempt to generate public support for additional government action, unless this measure was taken as part of a wider set of measures.

## *10. Enhanced Fuel Quality Requirements*

The automoblie industry suggests that fuel quality standards could reduce GHG emissions in two main ways:

- through enabling the introduction of technology which requires certain properties such as lower sulphur content (e.g. direct injection gasoline engines); and
- by allowing existing vehicles to operate more efficiently.

Most stakeholders accepted the value of fuel quality standards for the former reason, but in the absence of supporting data, expressed strong reservations about whether the latter is a viable GHG reduction option.

Many jurisdictions, including British Columbia, Canada, the United States and some states currently regulate fuel quality. California has been a leader is setting high fuel quality standards and already requires low sulphur gasoline.

As discussed in Appendix C, there are many dimensions to fuel quality. The most commonly discussed fuel quality parameters are sulphur content and heavy metal content (lead, MMT, etc.) but there are also other important parameters. Fuel quality has a direct impact on CAC pollution emissions per litre of fuel burned in terms of the amount of SOx, NOx, particulate matter and other common contaminants.

Fuel quality also has an impact on fuel efficiency because vehicles equipped with some of the fuel efficiency technology currently being introduced or about to be introduced will not be able to meet CAC emission standards unless the sulphur content of gasoline is reduced. Federal fuel quality standards will ensure all Canadian gasoline has low sulphur content (30 ppm) by 2005. There is a dispute between the vehicle manufacturers and petroleum producers as to whether or not fuel quality has an overall effect on fleet fuel efficiency, as discussed in Appendix C.

British Columbia's fuel quality requirements are currently more stringent than the national standards in terms of the number of parameters covered and the stringency of the requirements. The primary mechanism for improving British Columbia's standards would be to require more rapid adoption of the 30 ppm sulphur level, which is being phased-in at the federal level by 2005. That could be done either by requiring all gasoline to meet the standard before the federal government's 2005 deadline or by requiring that gasoline which meets the 30 ppm standard be made available sooner and specifically identified.

According to the petroleum industry, some low sulphur gasoline is already produced and over the next four years or so the proportion will increase to 100%. The capital plans to increase the amount of low sulphur gasoline are already in place and can not be appreciably accelerated. The industry does not currently identify which gasoline is low sulphur. A requirement to identify and sell low sulphur gasoline as a separate product would be costly for the industry. If all gasoline in British Columbia was required to meet the low sulphur standard in advance of the federal standard, low sulphur gasoline would have to be imported, most likely from the United States.

Environmental Objective

Ensuring that low sulphur gasoline is available in British Columbia might allow fuel efficiency technology currently being introduced in California to be introduced in British Columbia earlier, although vehicle manufacturers state that there are currently no vehicles available in California that are not available in Canada. If there are models introduced in California because of higher quality fuel and British Columbia is able to have those same models marketed in British Columbia, the province would experience a very modest but positive impact on GHG emissions.

A voluntary agreement with the automobile manufacturing industry might be required to ensure introduction of the technology only in British Columbia, if low sulphur gasoline is not readily available elsewhere in Canada. The British Columbia Ministry of Environment, Lands and Parks notes that the auto industry has previously stated that such an agreement would not be sufficient to cause a change in current marketing strategies for cleaner technology vehicles in British Columbia.

To the extent that enhanced fuel quality standards increase the price of fuel (see the economic implications below), that would serve to reduce vehicle distance traveled and thus GHG and CAC pollution emissions.

There is no known source for an estimate of the impact. However, given the fact that low sulphur fuel will be available within five years, and the fact that the availability of low sulphur fuel would at most have a small impact on the fuel efficiency of a small proportion of new vehicles sold, there would be a negligible GHG impact. The impact resulting from higher gasoline prices would be more significant.

The measure would reduce CAC (SOx) emissions from all vehicles using low sulphur gasoline.

Economic Implications

The petroleum industry has suggested that there would be significant costs associated with selling low sulphur gasoline as a separate product or importing low sulphur gasoline from the United States. The measure would likely result in an increase in fuel prices, which would have an inflationary impact and act to reduce economic growth.

There are no apparent regional implications.

Social Implications

To the extent that enhanced fuel quality standards increase the price of fuel, vehicle distance traveled would be reduced and a positive impact would be felt on traffic congestion and public safety. An increase in the fuel price may be somewhat regressive, depending on the access low-income individuals have to transportation alternatives, such as public transit. There would be no implications for consumer choice.

Uncertainty

Moderate – British Columbia already has its own fuel quality standards and the types of changes would be easy to develop, with predictable long term results. The uncertainty would come from whether or not a change now would have any short term impact. In the absence of any data to support the claim that GHG emissions will be reduced from the general vehicle fleet, it is not clear that this measure would have any impact other than to support the future introduction of technologies which rely on cleaner fuel.

Acceptability Implications

Rising fuel prices have raised people's sensitivity to fuel prices. Any measure that serves to increase fuel prices further would likely generate public objections.

## 11. Fuel Quality Tax Measure

As an alternative to a regulatory fuel quality requirement or as a complementary measure during the period when low sulphur gasoline is being phased-in, the provincial government could provide a lower motor fuel tax rate for low sulphur gasoline (30 ppm or less) to equalize the price of high and low sulphur fuel at the pump. This would allow niche marketing of cleaner fuel to support the introduction of cleaner technology (as described in the previous option), while sending a price signal about government's preference for such cleaner fuel.

A similar tax measure was introduced in British Columbia during the phase-out of leaded gasoline and it was successful in keeping leaded and unleaded gasoline prices equal.

This option would require that low sulphur gasoline be identified and sold as a separate product, which it currently is not. As discussed above, the petroleum industry argues that identifying and selling low sulphur fuel as a separate product would impose significant costs.

The measure could be designed to be revenue neutral, with the standard tax rate increased and the low sulphur tax rate decreased to achieve revenue neutrality while allowing the petroleum industry to recover the extra costs of marketing low sulphur fuel separately.

Environmental Objective

There would be a modest positive impact on GHG emissions if the measure resulted in greater availability of low sulphur fuel and, as a result, fuel efficiency technology was introduced in the British Columbia market earlier than it would otherwise have been. As with fuel quality standards, this may require an agreement with industry. As with the fuel quality requirement option, the impact would likely be less than 1 percent of British Columbia light duty motor vehicle GHG emissions.

By increasing the use of low sulphur gasoline, CAC pollution emissions would be reduced across the entire vehicle fleet. The extent to which CAC would be reduced would depend on the availability of low sulphur gasoline and the relative price difference. Availability might require either a regulatory requirement to make low sulphur gasoline available or a voluntary agreement with the petroleum industry to make low sulphur gasoline available earlier.

Economic Implications

The economic implications depend on how the tax measure is designed. A tax reduction for low sulphur gasoline with no increase to the standard tax rate would provide an economic stimulus that would roughly offset the effect of increased costs to the industry to produce low sulphur gasoline. If the measure is designed to be revenue neutral while allowing the industry to recover the additional costs of selling low sulphur gasoline separately, there would be a small negative macro-economic impact because the result would be a slight overall increase in gasoline prices.

Depending on design, the measure would either have a negative or neutral impact on inflation. There would be no distributional implications so long as the measure was designed to equalize prices.

Social Implications

Low-income earners and the disadvantaged would not be affected by this measure unless it results in a price increase. The measure would not have any effect on consumer choice. There would be no effect on congestion or traffic safety.

Uncertainty

Moderate – British Columbia previously implemented a similar measure to encourage the phase-out of leaded fuel. The uncertainty would come from whether or not a policy change now would accelerate the introduction of low sulphur fuel.

Acceptability Implications

A revenue neutral increase in the base tax rate and reduction in the low sulphur tax rate could be perceived as a straight tax increase because prices would rise overall somewhat. Given recent increases in fuel prices, an additional increase would likely generate some public opposition. A measure that equalized prices at status quo levels and therefore had a revenue cost to government would not raise any obvious acceptability issues.

## *12. Enhanced Scrap-It Program*

The Scrap-It program in the Lower Mainland provides an economic incentive to scrap vehicles that can not meet the AirCare program standards. The program is primarily directed to reducing CAC pollution emissions, although larger, older vehicles are generally less fuel efficient as well as more polluting. The program could be enhanced by explicitly targeting vehicles with high GHG emissions (low fuel efficiency), increasing the amount that will be paid in cash or kind to purchase the vehicles, or by expanding the program to the entire province and removing the requirement that the vehicle has failed the AirCare test, at least outside of the Lower Mainland. It could also be done by adding a component to the program under which high emission vehicles are actively but surreptitiously sought out, purchased and scrapped, rather than relying solely on vehicle owners to bring vehicles to the program.

One of the primary difficulties of such a program is determining which vehicles should be eligible for purchase and scrapping. One way would be to set an age limit (i.e. a vehicle must be older than a certain model year) combined with original fuel efficiency ratings of a set threshold or worse. All vehicles meeting the age and/or fuel efficiency threshold would be eligible. That would require developing a list of eligible vehicle models based on age and fuel efficiency ratings. Another approach would be to require vehicles brought forward for scrapping to be tested for fuel efficiency by AirCare using a test designed for that specific purpose and those failing the test would be eligible. (For example, any vehicles using 20 litres per 100 kilometers or more would be eligible for purchase and scrapping).

Environmental Objectives

This program would have a positive impact on both GHG emissions and CAC pollution emissions. There may be a takeback effect to the extent that replacement vehicles for those scrapped are more fuel efficient and therefore used more. However, to the extent that vehicles scrapped are not replaced and transit, bicycle or high occupancy vehicle use is increased instead, the emission reduction would be enhanced.

There is no known source for an estimate of the impact of the Scrap-It program. If the program removed an extra 0.1 percent of the most inefficient vehicles from the fleet (i.e. 2,000 vehicles at $1000 each for a total cost of $2 million) the cumulative effect over 20 years would be 2 to 4 percent of British Columbia light duty motor vehicle GHG emissions, assuming the result would be to cut GHG emissions from those 2,000 vehicles by between one half and two thirds.[30]

Economic Implications

The cost of the program is the amount spent administering the program and purchasing vehicles to be scrapped. That would depend on how many vehicles were targeted and what maximum price would be offered to purchase the vehicles.

There would likely be little or no distributional or inflationary implications of the program.

Social Implications

The program could be beneficial to low-income earners if it provided a better option to them than fixing or scrapping old and essentially worthless vehicles.

The program would not have any consumer choice implications or any significant congestion implications. There may be some public safety benefits if some relatively unsafe vehicles are removed from the roads sooner.

Uncertainty

Small – this would be a relatively minor adjustment to an established existing program.

Acceptability Implications

There are no obvious acceptability implications, unless the program design is too complex, generating a negative response.

## *13. Enhanced AirCare Program*

The AirCare Program in the Lower Mainland is primarily directed towards reducing CAC pollution emissions, although it has a positive effect on GHG emissions since repairing or scrapping polluting vehicles also usually increases fuel efficiency. The testing is considered to be more accurate for pollution emission purposes than for measuring fuel efficiency and there is no fuel efficiency standard that vehicles are required to meet.

AirCare II will provide enhanced testing of vehicles but the frequency will be decreased from an annual test to one test every two years. That enhanced testing should provide better fuel efficiency information. On that basis, it may be possible to add a fuel efficiency standard to the

[30] Assume there are 2 million vehicles in BC with an average efficiency of 8 litres/100km. An average annual use of 15,000 km uses 24 billion litres of fuel. Replace 2,000 vehicles with average fuel efficiency of 16 to 24 litres per 100 km and fleet average usage with 2,000 vehicles with the fleet average fuel efficiency and usage . The reduction in fuel used would be 0.1 to 0.2 percent, times 20 years gives 2 to 4 percent.

AirCare program explicitly. For example, a vehicle might fail the AirCare test if its measured fuel efficiency was 25 percent less than the vehicle's fuel efficiency rating when new. This would require that vehicle fuel efficiency ratings be known. It would also raise issues associated with after-market changes to vehicles. Additional work would be required to determine the technical feasibility of this option and the estimated impact it would have on GHG emissions.

To increase the effectiveness of the program for both GHG and CAC emission reductions, the program could be extended geographically to southern Vancouver Island (which does not have an air quality problem but may contribute to the Lower Mainland air quality issues) and to the Okanagan (which does have an air quality problem). Such a change would capture a large proportion of the provincial vehicle fleet.

The program could be combined with an enhanced Scrap-It program, using failure to pass the AirCare fuel efficiency test as a basis for eligibility.

Environmental Objective

This program would have an impact on GHG emissions across the vehicle fleet in the Lower Fraser Valley if a fuel efficiency standard was added, and possibly on southern Vancouver Island and the Okanagan Valley, if the program were extended. It would have little impact on CAC pollution emissions, since the program already targets those emissions, except to the extent the program was extended geographically.

The increase in fuel efficiency would produce a takeback effect, somewhat offsetting the GHG and pollution emission reductions of the program.

There is no known source for an estimate of the impact the program would have on GHG emissions and that impact would depend on program details. However, it seems likely that the impact would be greater than 1 percent and less than 10 percent of British Columbia light duty motor vehicle GHG emissions.

Economic Implications

The economic cost of the program would arise from increased administrative costs, increased waiting time due to more comprehensive vehicle testing and the cost of repairs to ensure vehicles meet the new standard.

There would be no inflationary impact.

Distributional implications arise because the program is currently limited to the Lower Fraser Valley. That is justified for the pollution reduction objective of AirCare since the pollution problem is most significant in that area, but cannot be justified for non-local objectives such as climate change. Unless the program is expanded outside its current geographic area, residents of the Lower Fraser Valley would bear most of the economic costs for a province-wide policy objective, and those outside the area covered by the program would not incur any significant costs.

Social Implications

The program is somewhat regressive because older or less intensively maintained vehicles tend to fail the test and require repairs. Such vehicles are more likely to be owned by low-income

earners. There would be no reduction in consumer choice. The take-back effect might have a slight impact on congestion and traffic safety.

Uncertainty

Although this would be a relatively minor adjustment to an established existing program, work would be required to determine the technical feasibility of adding a fuel efficiency standard and to determine how effective the program would be in reducing GHG emissions.

Acceptability Implications

Two of the main public concerns with AirCare and other inspection and maintenance programs are the cost of the program in terms of inspection fees and the time required to have the vehicle inspected. If the addition of a fuel efficiency test increased administrative cost, that would likely be reflected in inspection fees and could generate public opposition. If the test required additional time to perform the test and therefore additional waiting time, that could also generate public opposition.

If the determination of the standard for a particular vehicle is complex or viewed as unfair in some circumstances, that could also reduce public acceptability.

## *14. Public Education*

By raising the profile of the GHG issue and providing drivers with information about how their behaviour affects GHG emissions, it may be possible to influence behaviour and reduce emissions. Mandatory driver training as part of the graduated licensing program provides one potential channel for providing such education. General advertising is another option. The primary issue is who would develop and fund the public education program.

Environmental Objective

There should be some modest positive effect of public education on fuel efficiency through affecting the purchase decision of some individuals and through changes in the way vehicles are operated and maintained. To the extent that public education reduces the total vehicle distance traveled, if any, there would be a complementary reduction in CAC pollution emissions.

There is no known source for an estimate of the impact of public education on GHG emissions and the impact would depend on the specific program design. For the purpose of this paper, the impact has been rated at likely less than 1 percent.

Economic Implications

The economic impact of a public education program would be equal to the cost of the program, regardless of how it is funded. There would be no inflationary or distributional impacts.

Social Impacts

To the extent that public education is effective in influencing driver behaviour, there should be associated benefits in terms of reduced congestion and increased traffic safety. There would be

no reduction in consumer choice or any negative implications for low-income or disadvantaged individuals.

Uncertainty

Small – public education is part of the ongoing responsibility of government in many areas.

Acceptability Implications

There do not seem to be any acceptability concerns that would be raised by increased public education.

# Options to Reduce Vehicle Distance Traveled

## *15. Distance Based Insurance*

Distance based insurance is automobile insurance where the premium is proportional to distance traveled or other indicators of vehicle usage, such as time spent driving. There is evidence that the risk of accident increases with vehicle usage. Distance based insurance would not replace other factors used to determine insurance premiums such as previous driving records. Rather, it would be another factor in pricing insurance using actuarial practices and would be done to price insurance more accurately, thereby reducing the number and cost of accidents and insurance. Because ICBC has a monopoly on the provision of mandatory automobile insurance, it would be easier to implement distance based insurance coverage in British Columbia than in jurisdictions where all insurance is provided by the private sector.

Although the reason for implementing distance based insurance would be to improve automobile insurance, it could have a significant complementary impact on GHG and CAC pollution emissions by reducing overall vehicle distance traveled. The annual cost of automobile insurance in British Columbia is on the same order of magnitude as the annual cost of fuel, but insurance has traditionally been a fixed cost and fuel a variable cost. Distance based insurance would make insurance a variable cost, effectively doubling the cost of driving each additional kilometre.

The effectiveness of the incentive would depend partly on how the insurance premium is collected. If collected as an annual lump sum, there would be some impact but it would be less effective than collecting the premium on a regular basis throughout the year (e.g. monthly). Annual collection of the premium could involve the use of certified odometer readers who would inspect the odometer for tampering and provide the reading to ICBC. Regular collection of premiums might involve the use of GPS technology coupled with wireless communications to send billing information to ICBC monthly.[31] This would also address two of the most often raised concerns about distance based insurance, which are that it would encourage odometer

[31] A US insurer, Progressive Insurance, operates such a program in Houston. The program is currently being evaluated by the US EPA to determine its impact on distance traveled. The GPS/wireless communications units cost US $350 per vehicle on an aftermarket basis, but navigation systems being built into current and future vehicles would reportedly be able to fulfil the same function at no incremental cost. The cost will also likely fall if programs using this type of technology become more widespread.

tampering and that the cost and inconvenience of odometer reading would impose too high a compliance cost.

There are a number of administrative issues that would need to be addressed to implement distance based insurance, including the infrastructure for recording distance traveled and the method for phase-in of the product. It could be phased-in on a voluntary basis allowing people to decide whether to elect distance based or flat premiums, so long as the insurance pools were kept separate for actuarial and pricing purposes. In a voluntary program, people could also be given the choice of automated collection of billing information or having the odometer read by a person. ICBC is concerned about the possible administrative costs involved but others argue that those costs would be relatively small compared to the benefits.

Environmental Objective

Distance based insurance would provide a significant, ongoing incentive to reduce vehicle distance traveled and would therefore reduce GHG and CAC pollution emissions.

The cost of distance based insurance would vary with risk factors but on average would be equal to current average insurance costs. Assuming $1,000 average premiums and 15,000 kilometres average annual vehicle usage, the average cost would be about 6.7¢ per kilometre which is equal to the cost of fuel per kilometre for a vehicle that uses 8.4 litres/100 kilometres at a price of 80¢ per litre. However, the elasticity would not be as large as the fuel price elasticity because the effect would be felt only through reduced vehicle usage, not also through the increased fleet fuel efficiency associated with fuel price increases. A 10% decrease in vehicle usage and thus GHG emissions over 20 years is believed to be conservative.

Economic Implications

If successful in meeting its objectives of better pricing insurance, distance based insurance should have a positive economic impact as the loss from accidents would be reduced. This benefit would be offset to the extent that there are additional administrative costs associated with distance based insurance.

If voluntary, there should be little or no impact on business, although insurance industry buy-in would be important as part of detailed program design.

Social Implications

Distance based insurance would be progressive because it would give low-income earners more flexibility. It would have social benefits associated with increased traffic safety and reduced congestion.

Uncertainty

Moderate – although there is a similar program offered by an insurance company in Texas, this would be a significant departure from the traditional approach to providing motor vehicle insurance, with considerable work required to implement the program fully. However, implementation on a voluntary basis, initially in a single geographical market and expanding slowly should allow practical issues to be resolved without creating undue risk.

Acceptability Implications

Public acceptability would depend on people's perception of any additional costs they would bear in terms of providing billing information. If an automated system of collecting billing information is used that provides detailed information about travel, there will likely be privacy concerns. Both these concerns would be reduced if the program were voluntary, so that people could choose either fixed or distance based premiums.

## *16. Tax Shift to Variable License and Other Fees*

Vehicle license fees could be made variable by basing them on vehicle usage.

If done on the basis of distance traveled, the result would be similar to the implementation of distance based insurance in that a current fixed cost would be converted to a variable cost. However, unlike distance based insurance, it would be possible to continue increasing the amount over time to increase the impact.[32] The impact would be only on distance traveled, with no complementary impact on fuel efficiency.

To provide a fuel efficiency impact, distance based fees could be calculated using rates set according to the age and fuel efficiency rating of the vehicle. That would provide an incentive both to reduce vehicle distance traveled and to move to more fuel efficient vehicles. However, such a program would have all the administrative issues associated with distance based insurance and with a feebate applied to used vehicles. It should be noted that a fuel tax increase would have virtually the same impact as a sophisticated distance based fee structure that varies with vehicle fuel efficiency, with considerably less administrative burden and complexity.

Whatever type of fee structure was chosen, the result would be a significant increase in government revenue, which would be applied to a tax shift, as discussed under "Tax Shift to Fuel Tax."

Environmental Objective

There would be significant potential GHG and CAC pollution emission reduction from the conversion of fixed costs to variable costs and increasing the amount of the fees because that would reduce total vehicle distance traveled. There would be an even greater impact on both GHG and CAC emissions from making the distance-based fee vary with fuel efficiency and vehicle age since that would not only reduce vehicle usage but also increase fleet fuel efficiency and reduce average CAC emission levels by encouraging the removal of older vehicles from the fleet. In the first case, the result would be proportional to the impact of imposing distance based insurance, with a 1¢ per kilometer rate reducing GHG emissions by 2 to 4 percent. Combining a distance based fee with a fee structure based on fuel efficiency could double the impact.

[32] That would not be possible for distance based insurance since the insurance premium should reflect risk and costs and not be an arbitrarily established government fee.

Economic Implications

The use of an appropriate tax shift would offset most or all of the economic costs associated with significant increases in the amount of fees to be paid (see "Using Tax Shift to Offset Economic and Social Impacts"). The impact on inflation and distributional implications would depend on the specific tax shift chosen.

There would be administrative costs associated with implementing this measure that would be similar to the costs of implementing distance based insurance and the feebate on used vehicles.

Social Implications

Conversion of fixed to variable costs would have a similar progressive effect to distance based insurance, but significantly increasing the fees to be paid would likely be viewed as a regressive change, affecting low-income earners more severely. A properly designed tax shift could offset any increase in regressivity.

A measure that serves to reduce vehicle distance traveled will have complementary social benefits in terms of reduced congestion and improved traffic safety.

Uncertainty

Significant – no known example of existing distance based license fees. Considerable program design would be required and there would be little scope for phase-in.

Acceptability Implications

There may be a public acceptability issue related to convincing the public that the tax shift is actually revenue neutral and not a tax increase. In addition, depending on exactly how the measure is implemented, the same public acceptability concerns as for distance based insurance would arise, but there would not be the same scope to introduce this measure on a voluntary basis to mitigate those concerns. Administrative complexity associated with making the fees vary with fuel efficiency could also raise public acceptability concerns.

One possible approach would be to introduce this type of tax shift several years after the introduction of voluntary distance based insurance to reduce the administrative costs and public resistance associated with program administration.

## *17. Parking Policy*

Parking policy refers to a wide range of measures to increase the cost of parking and limit the supply of parking to provide an incentive to use alternatives such as transit, car pooling and bicycling, thereby reducing total vehicle distance traveled. Most parking policy measures are currently within local government control, although provincial government legislation could be used to impose or require local governments to impose various parking policy measures.

Examples of parking policy measures include:

- taxing parking spaces;
- eliminating free parking;

- taxing employee parking benefits;
- parking cash-out, where employees choosing not to take advantage of subsidized parking receive the equivalent benefit in cash;
- establishing maximum parking allocations for new developments (rather than the current common practice of minimum requirements); and
- many other potential measures.

Parking policy is a complex field and a full review of the area is beyond the scope of this paper. However, it should be noted that specific parking policy measures need to be carefully designed so that they actually reduce vehicle distance traveled rather than just changing the pattern of urban development by encouraging firms to locate elsewhere, by changing shopping patterns or by changing where people choose to park their vehicles.

Environmental Objective

Parking policies that are successful in reducing total vehicle distance traveled will have a positive impact on GHG and CAC pollution emissions. The amount of the impact depends on the specific measures used but a comprehensive and well-designed set of parking policies has the potential to have significant impacts.

There is no known source for the estimated impact of a comprehensive set of parking policies. The Apogee Research report[33] estimated that reducing work-related parking supply by 50% would reduce emissions by 1.5%, but noted the lack of other estimates and the importance of the specific program design. It seems likely that a set of parking policies could be designed that would have an impact in the range of 1 to 10 percent of British Columbia light duty motor vehicle GHG emissions.

Economic Implications

Parking policies work by increasing the cost or reducing the supply of parking. The resulting increase in costs will have a direct economic impact which will depend on the specific measures chosen. There will also be an inflationary impact to the extent that the price of parking rises. Distributional implications depend on whether the measures are introduced province-wide or only in major urban areas and whether the policies have an impact on shopping patterns. For example, one common concern about some types of parking policy, such as increasing the cost of on-street parking, is that it can disadvantage street-front merchants compared to those in malls.

Social Implications

The impact of parking policy on low-income earners will depend on the availability of alternative modes of transportation. The fewer the alternatives the more regressive parking policies are likely to be.

[33] Apogee Research International, Ltd., Ibid.

Parking policies that are successful in reducing total vehicle distance traveled will have complementary implications for congestion and traffic safety. Whether there is an impact on consumer choice depends on the specific measures chosen.

Uncertainty

Moderate – there are examples of parking policy measures that have been implemented or considered in several other jurisdictions. However, comprehensive parking policy programs are not widespread.

Acceptability Implications

Because the measures all work to increase the cost of parking directly or indirectly, public resistance to the increased cost can be expected.

## *18. Tax Shift to Road Tolls*

Tolls are currently used in British Columbia only on the Coquihalla Highway. However, a comprehensive set of tolls on existing highways could be used as an incentive to reduce total vehicle distance traveled and, with appropriate pricing, specifically to provide an incentive to travel at off-peak times, reducing traffic congestion and the need for highway expansion.

Traditionally, the major problem with road tolls was that collecting the tolls at toll-booths was itself a source of congestion, compliance cost and public resistance. However, automated billing of road tolls through vehicle recognition technology and the use of electronic transponders have overcome this hurdle. These technologies are now well proven and in operation in numerous jurisdictions, including Highway 407 north of Toronto. Smart card technology which is currently emerging has the potential to take automated billing of road tolls to the next level.

For road tolls implemented to reduce traffic to be effective, they need to be designed so that there are minimal alternative routes that do not attract a toll. The bridges in the Lower Mainland provide some natural barriers that would make an effective system of tolls somewhat easier to implement than in many other major urban areas.

Any system of road tolls designed to reduce vehicle use would generate significant amounts of revenue. That revenue would be used to finance a tax shift, reducing other revenue sources (see "Using Tax Shift to Offset Economic and Social Impacts").

An alternative to a large tax shift would be to limit the amount of revenue collected by providing vehicle owners with a monthly credit equal to, say, the average cost of tolls associated with non-peak use of tolled roads. That way, tolls would only be billed for greater than average vehicle use and for the incremental cost of peak-time use of the roads. The revenue generated would still be applied to a tax shift.

Environmental Objective

Road tolls have the potential to reduce GHG and CAC pollution emissions significantly by reducing vehicle usage if introduced comprehensively. Based on the analysis of fuel tax increases discussed below and distance based insurance, it seems likely that a comprehensive

set of road tolls or vehicle usage fees could reduce British Columbia light duty motor vehicle GHG emissions by between 10 and 40 percent. However, many believe that at present it would not be feasible for technical or acceptability reasons to introduce tolls on more than major highways, so less than 5 percent of vehicle usage would be affected and the impact would be less than 1 percent of GHG emissions.

Economic Implications

The primary economic implication would be the economic cost of the tolls, which would be offset by the tax shift reduction to another tax. The net economic impact would depend on what other revenue sources were reduced.

There would be distributional impacts depending on the tax shift tax reduction chosen. In particular, commercial vehicle owners who have little choice about the amount and the time they use the roads could be adversely affected by a comprehensive set of road tolls, regardless of what revenue sources are reduced. This could be addressed by setting the toll rates for commercial vehicles lower than for passenger vehicles or by not increasing commercial vehicle tolls during peak use times. Alternatively, commercial vehicles could be provided with a substantial monthly credit. On the other hand, reduced congestion could provide a significant economic benefit and positive impact to commercial vehicle operators.

Regional distributional implications may arise depending on the extent to which tolls are concentrated in the Lower Mainland or are also applied to major highways across the province. In the first case, Lower Mainland residents and businesses may be disadvantaged and in the latter non-urban areas may complain that they are disadvantaged because they have little alternative but to use the highway system. These regional implications would also depend on which tax was reduced as a tax shift measure.

Although automated tolling systems are proven technology, there would be substantial administrative costs associated with implementing and collecting comprehensive road tolls, which would result in a net economic cost.

Social Implications

Road tolls have the greatest potential to reduce congestion and increase traffic safety, since they can be directed specifically towards congestion through peak use pricing.

Road tolls may be regressive depending on the availability of alternative modes of transportation. To the extent they are regressive, that impact would be addressed if the tax shift tax reduction affected other regressive revenue sources. Regressivity could also be addressed by providing a monthly credit to cover a certain amount of vehicle use so that there is only an incremental cost to discretionary vehicle use.

Uncertainty

Significant – while considerable work has been done on road tolls and other jurisdictions use road tolls much more extensively than British Columbia, there are few if any examples of wide-area road use pricing based on ITS technology. The technology is advancing rapidly but there is still considerable uncertainty around the technology, program design details and public policy considerations.

Acceptability Implications

As with other tax shift measures, a major issue would be convincing the public that the net effect is revenue neutral. Even so, to the extent that road tolls generate increased costs for vehicle use even if other taxes on individuals are reduced, public resistance is likely. Resistance might be reduced by providing a monthly credit, as discussed above. As with distance based insurance and variable license fees, the collection of detailed information about individuals' travel would raise privacy concerns.

## Options to Address Both Issues

### *19. Tax Shift to Fuel Tax*

Fuel costs represent a significant proportion of the annual operating costs of a vehicle and are currently the main element of vehicle costs that varies with the amount the vehicle is used. Any increase in the price of fuel will have a short term impact on the amount that vehicles are used and, if the price increase is permanent, will have a longer term effect of inducing consumers to choose more fuel efficient vehicles. Both of these impacts act to reduce GHG emissions.

There have been significant increases in crude oil prices and in vehicle fuel prices over the past year. Those increases will have an impact on GHG emissions and have raised people's sensitivity to fuel prices.

A significant increase to gasoline taxes could be used as a way of further increasing fuel prices. Such an increase could be a large immediate increase or phased-in increases of a certain amount each year. The result would be a significant increase in government revenues. There would also be a significant negative economic impact from higher prices and social impacts to the extent that fuel taxes are regressive.

Both the economic and social implications of a significant fuel tax increase could be offset by using the increased revenue from the fuel tax to reduce taxes that have a larger economic impact (see "Using Tax Shift to Offset Economic and Social Impacts").

One tax shift that would directly offset some of the negative implications of a fuel tax increase may be to eliminate vehicle license fees and other fixed fees imposed on vehicle use by government, such as the annual license fee. As fixed fees, these are both regressive and economically inefficient. In addition, it would be viewed as fair to return some of the additional revenue taken from vehicle users through increased fuel taxes to those same users through reduced fixed vehicle user fees.

Another tax shift might be to reduce diesel fuel taxes while increasing gasoline taxes since diesel vehicles are more fuel efficient. However, diesel is generally viewed as a greater contributor to CAC emissions, at least at current levels of sulphur in diesel fuel.[34]

[34] It should be noted that diesel powered light duty motor vehicles are subject to CAC emission standards and new, more stringent standards and standards for sulphur content in diesel fuels are expected to be introduced in the near future.

Environmental Objective

The increased fuel tax rate would reduce both GHG and CAC pollution emissions by reducing the total vehicle distance traveled and would have a secondary impact by encouraging consumers to purchase more fuel efficient vehicles. Several studies have suggested that increased fuel taxes are the most effective mechanism available to reduce light duty motor vehicle GHG emissions.

Estimates of the own-price elasticity of demand for fuel vary from –0.1 to –0.4 in the short run and from –0.5 to –1.2 in the long run (see Appendix C for a discussion of elasticities). A 1¢ per litre increase in the price of gasoline would be an increase of about 1.3 percent at current prices. That would reduce consumption (and GHG emissions from light duty motor vehicle use) by in the range of 0.1 to 0.5 percent in the short run and 0.6 to 1.5 percent in the long run.

Using a long run elasticity of -0.3 to -0.6 the Apogee Research report[35] estimated that a program of annual increases of 2¢ to 3¢ per litre (3.5 to 5.2 percent of 1995 gas prices) over twenty years would generate reductions of 21 to 44 percent for the 2¢ increase and 33 to 65 percent for the 3¢ increase.[36] At current prices (about 80 ¢ per litre) equivalent tax increases would be 2.8¢ to 4.2¢ per litre.

Economic Implications

The net economic implications of the tax shift would depend on what tax or taxes are reduced to offset the increased fuel tax and how those revenue reductions are implemented. However, in general terms, a genuinely revenue neutral tax shift designed to offset the economic impact of a fuel tax increase should have little net impact on GDP.

The impact on inflation also depends on what taxes are changed and how. A PST rate decrease would neutralize the inflationary impact of a gasoline tax increase while a change to corporate income tax or personal income tax would have little or no impact on inflation.

There would be distributional effects since the tax shift would result in some individuals and businesses paying more tax overall and some paying less, depending on which taxes were adjusted. It may be possible to design a tax shift that specifically targets commercial vehicle users with a tax reduction or rebate of some kind to offset the fuel tax increase and minimize the impact of higher fuel taxes on the transportation costs born by business and ultimately consumers.

Social Implications

An increase in fuel tax is generally believed to be regressive on the assumption that low-income taxpayers have little scope to vary their gasoline purchases. However, depending on the availability of options such as transit and car pooling, low-income taxpayers may be able to limit

[35] Apogee research International, Ltd., Ibid.

[36] It should be noted that an elasticity of -0.6 is a conservative estimate compared to estimates in the literature, but those estimates include both a consumer response (less vehicle usage, purchase of more efficient vehicles) and a producer response (production of more fuel efficient vehicles), but a tax increase in British Columbia alone would not result in any producer response. Thus, even though this estimated elasticity is conservative, it makes sense to use it to determine the upper end of the range.

the impact of a fuel tax increase effectively, reducing the regressivity of the measure. In any event, if the revenue from the fuel tax increase is used to reduce another tax that is at least as regressive as the fuel tax, the net result should not have much impact on most low-income taxpayers.

The fuel tax increase would have social benefits associated with reduced congestion and increased traffic safety due to reduced vehicle distance traveled.

The measure would not reduce consumer choice.

Uncertainty

There would be little uncertainty associated with the fuel tax increase part of this measure as the fuel tax system is a stable and mature administrative system that would not be significantly affected by a rate increase, except to the extent that additional efforts may be required to ensure compliance and minimize smuggling and/or cross-border purchases. The uncertainty associated with the tax shift would depend on what taxes are changed and how they are changed.

Acceptability Implications

The primary acceptability implication would be that it may be difficult to convince people that the package of measures is really revenue neutral. Even if the public believes the measure is revenue neutral, there is likely to be resistance to further increases in fuel prices regardless of what other taxes are reduced.

## *20. Tax Shift to Fuel Tax if Fuel Prices Fall*

The purpose of this option would be to retain some of the reduction in GHG and CAC emissions expected to result in the long run from current high fuel prices. As discussed in Appendix A, elasticity estimates related to fuel prices vary considerably but a long run elasticity of -0.6 is considered by many to be a conservative estimate for a continent-wide fuel price change. That would mean that current fuel price levels could result in a 30% or greater decrease in fuel consumption over the long run (say 20 years) if prices do not fall. This would work by both encouraging vehicle purchasers to purchase more fuel efficient vehicles (and therefore encouraging manufacturers to produce more fuel efficient vehicles) and by encouraging users to use their vehicles less.

In the event that fuel prices do begin to fall, that would tend to reverse the impact of the higher prices and would reduce the long run GHG and CAC reductions. A fuel tax increase triggered by falling fuel prices would act to maintain some of the environmental benefits of current high prices. It would maintain only *some* of the environmental benefits because unlike the high prices which originate in the world-market, fuel taxes are only local. There would therefore be little or no sustained pressure on manufacturers to improve fuel efficiency because of a British Columbia fuel tax increase. However, the measure would encourage buyers in British Columbia to purchase more fuel efficient vehicles and to reduce vehicle usage.

The measure would work through legislation that automatically adjusts fuel taxes in response to reductions in fuel prices, as measured by the gasoline price component of the CPI for British Columbia as prepared by Statistics Canada, for example. The main parameters to be set are

the trigger point at which tax increases are commenced, the amount of the tax increase as compared to the change in fuel prices and the tax shift measures to ensure overall revenue neutrality.

Environmental Objective

If triggered, this measure would have an impact on both GHG and CAC, as described under the previous option. The specific impact would depend on the circumstances and the degree to which the automatic fuel tax increases offset fuel price decreases. For example, a one-to-one fuel tax increase fully offsetting any fuel price decrease would have a greater impact than an increase that takes effect if fuel prices fall by more than 10% and raises taxes to offset one-half of the price decrease.

Economic Implications

The economic implications would be subject to the same analysis as the previous option. Design of the tax shift could reduce or reverse the macroeconomic impact of higher fuel taxes and some of the distributional impacts.

Social Implications

The social implications would be similar to the tax shift to fuel tax option and would depend on the tax shift chosen.

Uncertainty

As with the previous option, there would be little uncertainty associated with the fuel tax part of this option. The uncertainty associated with the tax shift would depend on what taxes are changed and how they are changed.

Acceptability Implications

As with the previous option, it would be a challenge to convince taxpayers that the measure is actually revenue neutral and to gain support for a measure that prevents fuel prices from falling, given the growing pressure for fuel taxes decreases to reduce the effects of current high prices.

## *21. Emissions Capping and Credit Trading*

This refers to the concept of capping total emissions and providing emitters with an emission allocation. Those who exceed their allocation would have to purchase credits from those who do not use their entire allocation. Emission trading allows those who can reduce emissions at the lowest cost to benefit by selling excess allocations and those that would pay the highest cost to reduce emissions to benefit by purchasing unused allocations instead of reducing emissions, thus reducing their total cost. This concept is usually discussed at the government or industry level, but could conceivably be applied to individual vehicle owners in the context of an overall system. It has been suggested by some that this type of approach holds the greatest promise for reducing global emissions at the least overall economic cost.

Without examining the details, it appears that such a system is feasible but potentially administratively complex.[37] It seems likely that consideration of such a system applied to light duty motor vehicles would first require the existence of a functioning national or international capping and credit trading system so that, at best, this is a long term option.

This measure has the advantage of dealing with light duty motor vehicle emissions within the context of a broad solution to the issue. It has the disadvantage of such a broad solution being some ways off and by no means certain ever to be implemented.

Environmental Objective

If the system can be successfully implemented for individual vehicles, it would provide an incentive both to reduce vehicle distance traveled and to purchase more fuel efficient vehicles. It is the flexibility in response offered by this type of program that reduces the economic costs associated with GHG reductions. The result could be significant reductions in GHG from light duty motor vehicles, within the context of overall reductions in emissions nationally and internationally.

Economic Implications

This type of system is believed by many to be the most economically efficient approach to GHG reductions overall. Whether or not that remains true for light duty motor vehicles depends on the administrative and compliance costs of the system, which could be significant or minor depending on the type of system implemented and the details of the system.

Social Implications

Such a system would not be regressive and would have significant complementary impacts on congestion and traffic safety to the extent that the system provides an incentive to reduce vehicle usage.

Uncertainty

Significant - although the subject of considerable work around the world, implementation of a comprehensive national or international system is clearly a long way off.

Public Acceptability

Public acceptability would depend on how complex the system appears to the individual driver and whether it is perceived as imposing additional costs on the average driver. There may also be privacy concerns, depending on system design.

[37] The degree of administrative complexity would depend on how the measure was implemented. If applied directly to emitters (sometimes called downstream emission trading) the complexity depends on the number of emitters, which would be significant at the individual driver level. Alternatively, applying the measure directly on fossil fuels ("upstream emission trading") would be less complex and would place no compliance burden on individual emitters.

## 22. Combination – E.G. Annual Vehicle License Feebate, Enhanced Scrap-It Program, Enhanced AirCare Program, Public Education and Distance Based Insurance

This option would be to implement a number of different measures, perhaps over a planned phase-in period to address the light duty motor vehicle GHG emission issue on a number of fronts. The idea would be to combine measures that are in some sense complementary. In that way it may be possible to use one measure to offset the drawbacks of another and to reduce the magnitude of the various measures by relying on the combination of measures rather than a single measure to have a significant impact.

A specific set of measures is proposed here as an example. However, one example is clearly not the only combination of measures that could be used AND it is not likely to be the best combination. The set of measures has been chosen more to illustrate the concept than to suggest a particular group of measures.

The measures chosen – Annual Vehicle License Feebate, Enhanced Scrap-It Program, Enhanced AirCare Program, Public Education and Distance Based Insurance – may be complementary. For example, a draw-back of the Annual License Feebate option is that it only affects fleet fuel efficiency and does nothing to reduce vehicle usage and, in fact, will encourage increased usage. Conversely, Distance Based Insurance does nothing to increase fleet efficiency but would have an impact on vehicle usage. Together, the two measures address both issues and may be more environmentally effective, acceptable to the public, or feasible than alternatives such as increased fuel taxes or emissions capping and trading. The enhanced Scrap-It program and Enhanced AirCare program clearly fit well together and may enable the size of the maximum fee charged under the Annual License Feebate option to be lower because these programs also work to increase scrappage and increase overall fleet fuel efficiency. Finally, Public Education may be the appropriate starting point to raise the profile of the issue and increase public acceptability while beginning to address the issue.

Environmental Objective

The overall contribution to achieving the environmental objective of a combination of measures could be significant, depending on the measures chosen and way they are implemented. Combinations of measures have the potential to offset drawbacks inherent in single measures. For example, all of the measures directed only towards increasing the fuel efficiency of the fleet have the drawback that they also encourage increased vehicle usage, which could adversely affect CAC emissions slightly. However, combining that with a measure that reduces vehicle usage would offset any such effect.

Based on adding the possible British Columbia light duty motor vehicle GHG emission impacts of the various measures used in the example, the combined impact could be in the 20 to 50 percent range over 20 years.

Economic Implications

The economic implications of the option would depend on the options included and the specific design of each of those options. There does not seem to be any reason to expect that the

economic impact of combinations of measures to be either more or less than the sum of the individual impacts of the measures.

The example chosen would have impacts on business as a result of the license fee and AirCare options, possible macroeconomic benefits due to the Distance Based Insurance option and fiscal costs associated with the enhanced Scrap-It program and increased public education.

Social Implications

The social implications also depend on the measures chosen and the specific design of each.

The example chosen includes measures that are not regressive in nature. The Distance Based Insurance and the Annual License Feebate would have offsetting impacts on congestion and public safety, with a net positive impact.

Uncertainty

Depends on the measures chosen.

The example used would be moderately uncertain. Most of the elements in the example have little uncertainty associated with them, except for Distance Based Insurance, which is rated as moderately uncertain.

Public Acceptability

The acceptability of the option would also depend on the set of measures chosen. Overall the option may be less acceptable than the individual measures if the public sees the combination of measures as an over-reaction or a layering on of government programs. Alternatively, a successful public education component coupled with relatively low magnitudes of impact from individual measures, phasing-in of the measures and voluntary participation where possible (e.g. Distance Based Insurance) could serve to make the package more acceptable than one major individual measure.

## Concluding Comments

This analysis shows that there is a wide range of possible measures that could be implemented to reduce light duty motor vehicle emissions with differing levels of environmental effectiveness, economic impacts, social impacts, uncertainty and public acceptability implications. Some general observations that arise from the analysis include:

- "The devil is in the details." The discussion paper has not developed, in detail, all of the administrative and legal issues that would need to be addressed to implement these options. The particular details chosen can significantly affect the implications.
- Public acceptability could be a significant issue with many of the options. In general, public acceptance will require that either:
  - the public be convinced that climate change is a significant issue and that the province of British Columbia needs to make changes now; or
  - the measure is intended to address another problem that the public agrees needs to be addressed and that the climate change implications are a complementary benefit.
- Transparency is important. For example, for any tax shift option the fiscal impacts should be measured and publicly reported on an ongoing basis to demonstrate revenue neutrality and there should be ongoing monitoring and reporting on the environmental effectiveness of any option that is implemented.
- The current increase in fuel prices may go a long way towards reducing light duty motor vehicle GHG emissions. According to Statistics Canada, prices increased by 53% percent in British Columbia over the period March, 1999 to July, 2000. That could reduce light duty motor vehicle GHG emissions by 30 to 50 percent in the long run if prices do not fall.
- There is a strong link between any provincial government action on this issue and the proposed TransLink vehicle levy currently under consideration, which would affect about half of the vehicles in the province. Any provincial government measure would need to be coordinated with and take into account any TransLink decision on the vehicle levy.
- Several of the options, especially those rated high in terms of uncertainty, would benefit from pilot projects or phase-in to help mitigate public concerns and minimize administrative and compliance costs.
- It is evident from the Position Papers included in Appendix B that the focus of the interested parties is on the feebate option. Business related interested parties and the BC Automobile Association are opposed to a feebate on several grounds but consistently because they believe it would impose costs on business and consumers with little environmental benefit. Environmental groups are in favour of a feebate for several reasons, including concern about the trend towards the purchase of larger, less fuel efficient vehicles and the need for a jurisdiction to take the initial step.
- In spite of the focus by many interested parties exclusively on feebate, the analysis shows that there are other options[38] that clearly deserve more discussion as they may be environmentally effective, have low economic and social costs or provide benefits, be relatively certain and be reasonably acceptable to the public.

[38] Such as Annual License Feebate, Distance Based Insurance, Enhanced Scrap-It Program, Enhanced AirCare Program and Public Education.

# Appendix A – Terms of Reference

**Mandate:**

1. To consult with selected stakeholders to identify options to reduce greenhouse gases and emissions related to motor vehicle (passenger vehicle and light truck) use in British Columbia.

2. To consult with other stakeholders as required.

3. To identify and evaluate the environmental, social, economic, business and administrative implications (both positive and negative) of identified options.

4. To prepare a discussion paper for public release by September 30, 2000, outlining the identified options and implications.

**Scope:**

The consultant, together with stakeholders, will determine the range of options to be considered. Options should be considered within the context of Canada's international commitment to reduce greenhouse gases and with a full appreciation of existing motor vehicle regulations, taxes and fees, including the luxury tax, joint government-industry environmental programs related to automobiles (e.g., the Scrap-It program), existing environmental incentives for alternative fuel vehicles and regional transportation needs.

**Process:**

Stakeholders will be contacted directly by the consultant to obtain views on an appropriate, workable and timely process. The consultant is responsible for determining the most effective process for consultations.

**Selected Stakeholders:**

The consultant will offer to meet with the following groups, plus any others he believes are appropriate:

- British Columbia Automobile Dealers Association (BCADA)
- Canadian Vehicle Manufacturers' Association
- Association of International Automobile Manufacturers of Canada
- Suzuki Foundation
- West Coast Environmental Law Association
- Better Environmentally Sound Transportation
- Northwest Environment Watch - British Columbia (NEWBC)
- British Columbia Automobile Association (BCAA)

- Canadian Centre for Policy Alternatives
- Translink
- Ministry of Finance and Corporate Relations
- Ministry of Environment, Lands and Parks
- Ministry of Transportation and Highways
- Insurance Corporation of British Columbia
- BC Transportation Financing Authority

**Timeframe:**

Discussion Paper outlining options and implications to be completed by September 30, 2000.

# Appendix B – Participants

## *List of Participating Organizations*

| Organization | Contact |
|---|---|
| Association of International Automobile Manufacturers of Canada | Bob Armstrong |
| BC Automobile Association | John Ratel |
| BC Automobile Dealers Association | Paul Taylor |
| BC Ministry of Environment, Lands and Parks | Hu Wallis |
| BC Ministry of Finance and Corporate Relations | Andy Robinson |
| BC Ministry of Transportation and Highways | John Dyble |
| BC Transportation Financing Authority | Ann McAlister |
| Canadian Centre for Policy Alternatives | Dale Marshall |
| Canadian Petroleum Products Institute | Bill Levy |
| Canadian Vehicle Manufacturers' Association | Mark Nantais |
| David Suzuki Foundation | Gerry Scott |
| Greater Vancouver Regional District | John Newhook |
| Insurance Corporation of British Columbia | Cindy Brown |
| Northwest Environmental Watch BC | Donna Morton |
| TransLink | Clive Rock |
| Victoria Transport Policy Institute | Todd Litman |
| Westcoast Environmental Law | Chris Rolfe |

## *Submissions by Participants*

The following statements have been submitted by participants in the process. All participants were given an opportunity to include a statement of their position in an appendix to the report. These statements are intended to represent positions on the public policy issues rather than comments on the discussion paper.

The following organizations have submitted position papers:

- Association of International Automobile Manufacturers of Canada;
- British Columbia Automobile Association;
- British Columbia Automobile Dealers Association;
- Canadian Petroleum Products Institute;
- Canadian Vehicle Manufacturers' Association
- David Suzuki Foundation;
- Northwest Environmental Watch BC;
- Victoria Transport Policy Institute.

## *Association of International Automobile Manufacturers of Canada Position Paper*

ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS OF CANADA
L'ASSOCIATION DES FABRICANTS INTERNATIONAUX D'AUTOMOBILES DU CANADA

September 29, 2000

Mr. Dan Perrin
Perrin, Thorau & Associates Ltd.

Dear Mr. Perrin:

**Re: Discussion Paper on Options to Reduce Light Duty Vehicle Emissions**

The Association of International Automobile Manufacturers of Canada (AIAMC) would like to thank you for giving us the opportunity to participate in the study to Reduce Light Duty Vehicle Emissions. As agreed at the last meeting, each organization participating in the process may submit a position paper for inclusion in an appendix. The AIAMC wishes to take the opportunity to present our position.

The AIAMC represents international automobile manufacturers engaged in the manufacture, sales, and servicing of light duty vehicles in Canada. Each of these manufacturers of passenger cars, light duty trucks, vans, and special purpose vehicles, have head offices located outside Canada and the United States.

Members of the AIAMC have been in the forefront in recognizing the need to provide clean and fuel efficient vehicles to our customers to minimize the impact of emissions on the environment. Since 1988, our members have introduced three new generations of advanced emission control technology, each of which has met increasingly stricter emission standards. This year, a few of our members have introduced a fourth generation of super ultra low emission technology that is not required until the year 2004 in California. This technology is currently being sold in B.C., and other ULEV capable vehicles will be introduced in the 2001 model year. However, due to fuel quality issues, the residents of B.C. and Canada will not receive the full potential benefits of this advanced ultra low emission technology.

With regard to reducing fuel consumption and the associated greenhouse gases, our members' vehicles have shown a continuous improvement in fuel efficiency over the years. This is the result of continuous improvements in powertrains and reductions in vehicle weight, aerodynamic resistance and rolling resistance. According to NRCan, the average fuel consumption of the on-road vehicle stock has improved by 8% since 1990. In B.C. this figure may be distorted as the fleet is relatively older due to climatic conditions.

While these steady incremental changes in fuel efficiency have been achieved through vehicle refinements, it was recognized that a major change in propulsion technology would be required to increase fuel efficiency of today's vehicles by 25% to 75%.

.../2

Recognizing this need, many members of the AIAMC launched major research and development programs in the mid-1990s to significantly increase the fuel efficiency of their vehicles. The foresight to undertake this leading edge research has led to the introduction of hybrid electric vehicles (HEVs) in this millennium year.

This summer two of our members, Toyota and Honda, have begun to market in Canada fuel efficient and eco-friendly gasoline/electric HEVs. Toyota has introduced the HEV "Prius" and Honda the HEV "Insight" with 25% to 50% higher fuel economies respectively than similar conventional vehicles. In addition to being the two most fuel-efficient cars, the Prius is equipped with Super Ultra Low Emission Vehicle (SULEV) technology and the Insight with Ultra Low Emission Vehicle (ULEV) technology. As mentioned above, these vehicles cannot deliver the full potential benefits of this advanced ultra low emission control technology to the residents of British Columbia due to fuel quality issues.

Considering the progress that our members are making in reducing vehicle emissions and improving fuel consumption, it is the AIAMC's position that the way to improve air quality and reduce GHGs is to introduce the newest vehicle technology, across all vehicle classes, into the fleet. While all manufacturers are striving to bring the latest technology to market just to stay competitive, technology alone will not solve the problem. The Canadian economy is a market driven one and as such consumers have choice and make decisions based on their needs. If the consumer is sufficiently informed their purchase decision would become more rational.

It is our view that feebates do not encourage the introduction of more efficient new vehicles into the fleet. Indeed, feebates slow the introduction of newer technology by increasing the cost of the new technology vehicles and encourages owners to keep their older higher polluting and inefficient vehicles. Feebates penalize consumers who require larger or heavier vehicles due to business, geographical or family reasons. Consumers who are willing to purchase the latest advanced technology vehicles should not be required pay an extra fee.

While our primary discussion has been primarily directed at the constantly improving vehicle technology, it is critical that there be a focus on the role of the consumer and the driver. It is necessary to make the driving public aware of how their actions impact the environment. The driver's behavior while driving and the distance driven have a direct impact on fuel consumption.

Thank you for the opportunity to present the AIAMC's position on this very important issue. If you require further information, please contact me at (416) 595-8251 ext. 24 or by email at: barmstrong@importers.ca.

Yours truly,

*Original Signed*

Bob Armstrong
President

438 UNIVERSITY AVENUE, SUITE 1618, BOX 60, TORONTO, ONTARIO M5G 2K8

TELEPHONE: (416) 595-8251 FAX: (416) 595-2964 E-MAIL: auto@importers.ca

## *BC Automobile Association Position Paper*

**Submission to the**
**Consultation process concerning:**

**BC's Environmental Tax Shift Proposal**
**and**
***"Options to Reduce Motor Vehicle Emissions – (GHG)"***

**from**

**The British Columbia Automobile Association**

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The British Columbia Automobile Association (BCAA) has been in the forefront of organizations advocating cleaner running, less polluting vehicles for many years. Over thirty years ago, in our Annual Brief to Government, we called for anti-pollution devices to be installed in all new passenger vehicles at the time of their manufacture and for an annual vehicle emissions test in British Columbia.

Since 1991 we have lobbied for stricter emission standards and better fuel economy for all light duty trucks and private passenger vehicles. We have called repeatedly on the federal government to proclaim the *Motor Vehicle Fuel Consumption Standards Act*. We advocate a 10% improvement in fuel economy for all passenger vehicles over the 1997 Corporate Average Fuel Consumption (CAFC) Standards by 2002, and a 25% improvement by 2007.

BCAA is acutely aware of the dangers occasioned by Greenhouse Gas Emissions (GHG's) and the threat of global warming with its potential for climate change and extreme weather events. In 1999 we began a working relationship with Climate Partners Network Inc., a new British Columbia company, funding their initial start-up and market research. We supported their application to the federal Ministry of the Environment, Climate Change Action Fund for seed monies to launch ClimateCare Trust.

ClimateCare Trust, a non-profit organization, will actively solicit donations from motor vehicle owners based on a dollar value per tonne of their individual, annual GHG emissions. Monies raised will be used to fund GHG sequestration or offset projects. BCAA will participate in a Blue Ribbon Board of Advisors who will be responsible for the selection of appropriate offset projects submitted to Climate Partners Inc. ClimateCare Trust is to make its public debut later this year.

BCAA's commitment to environmental protection is well documented and we believe above reproach. Nevertheless, we cannot support the concept of tax shifting with respect to vehicle purchases that the provincial government is considering currently as a strategy to reduce GHG's.

CAA's public policy statement with respect to taxation (CAA Policy #2.1) states:

> **Any form of motor vehicle taxation designed to restrict the use of private passenger vehicles, to force motorists to change the type of vehicle they**

**drive, or to supplement general revenues of any level of government is opposed.**

Canada and several other nations have not ratified the Kyoto Accord, but British Columbia has decided to adopt it voluntarily. Reducing GHG emissions is a laudable goal but one that must be approached with care. Environmentalists warn of catastrophic results if urgent action is not taken now, but many conflicting opinions abound. Consequently, the benefits and costs of proposed GHG reduction programs need to be weighed carefully. We cannot impose fiscal measures that will have a negative impact on our recovering economy and still fragile levels of employment, without proof of the benefits such measures have. An economic impact study of Tax-Shifting is needed before this is implemented.

Philosophically it is easy to subscribe to the notion that products, services and activities that are deemed harmful to the environment should be taxed at a higher level, while those that are benign should be taxed not at all or at lower levels. We doubt the provincial government can achieve this without serious disruption to the market place. This is especially true if BC attempts this radical tax reform on its own, without the rest of Canada and even the United States, doing likewise.

In defining local strategies to reduce GHG's it is important to remember that while the transportation sector is responsible for some 37% of BC's greenhouse gas emissions, the private passenger automobile accounts for less than 50% of that figure, some 16% in all. This means that fully 80% of GHG's in this province are from other mobile and point sources. It is unfortunate therefore that the focus on GHG emission reduction seems concentrated on the automobile. Arguably this is in contradiction to its actual impact. We question the reasoning for this and for the Tax-Shift discussion paper, particularly as the Federal Transportation Table on GHG reduction judged tax-shifting one of the "least promising" solutions.

To effectively reduce private passenger vehicle GHG emissions and pollution, BCAA urges the government to achieve stricter fuel economy standards and improved pollution controls in all vehicles both nationally and cross border. In B.C. we should adopt a system of reward for those individuals and companies that meet or exceed voluntarily, desired emission reductions rather than imposing punitive tax measures on the car-buying public.

In our view the proposed Tax-Shifting scenario offers questionable results in the quest to reduce vehicle GHG emissions and should not be employed.

## *BC Automobile Dealers Association Position Paper*

### BC AUTOMOBILE DEALERS ASSOCIATION

### POSITION ON TAX SHIFTING

The BCADA welcomes the opportunity to comment on the provincial government's tax shifting initiative as it applies to automobile consumers. We represent almost 400 franchise automobile dealers in the province. The majority of our members are small individual or family owned businesses that in total employ over 16,000 people. Our members sell over $5 billion worth of new cars each year and account for 43% of the used cars sold annually in the province. Auto dealers generate $2 billion a year in economic activity in communities throughout the province and over $850 million annually in tax revenue for all levels of government.

On behalf of our members and the 370,000 people who buy new and used cars every year from our dealerships, the BCADA wishes to express our opposition to the imposition of a tax shifting initiative (feebates) on automobile owners. While we endorse the desire to reduce pollution and control GHG emissions, we believe feebates are an expensive bureaucratic experiment that will do little or nothing to improve the environment. Our position is supported by the province's own discussion paper (October, 1999) on environmental tax shifting which stated:

> **"Because it is difficult to predict how much pollution will fall if environmental taxes are implemented, these taxes can be a highly uncertain way of pursuing environmental targets."**

Feebates impose unfair penalties on people who have little choice in the vehicle they need for business, geographic or family reasons. They also encourage people to keep older, higher polluting, less fuel efficient vehicles at a time when we should be encouraging the purchase of newer, cleaner and safer vehicles.

Rather than improving the environment, tax shifting (feebates) is a big government attack on working people and small business which will result in substantial tax increases for a significant number of vehicle owners, a reduction in value for many vehicles, increased unemployment and most troubling – a loss of freedom of choice. Again British Columbia will be seen as a jurisdiction out of step with the rest of North America. And for what benefit?

The BCADA encourages the government to consider the following in addressing the important issue of air quality and the management of GHG emissions.

1). Improving air quality and controlling GHG emissions are separate issues that require unique approaches:

a) GHG emissions are a global problem that require a global solution. British Columbia is unable to solve this issue on our own. GHG emissions must be dealt with in the context of the comprehensive plan which is currently being developed by the Government of Canada and the provinces. British Columbia is a participant in this process. To single out B.C. car owners in the absence of this plan and a public debate on the trade-offs contemplated in the plan is unfair.

b) Air quality is a localized issue that requires a co-operative effort involving the residents of affected areas, industry and all levels of government. The automobile sector has a strong track record in voluntarily doing its part through the ongoing introduction of new vehicles with ever improving state-of-the-art emission controls. We need to build on the progress being made rather than putting in place penalties that reduce new vehicle affordability.

2). Specific objectives must be established for the reduction of GHG emissions and improvement of air quality. Only with clear objectives can we properly assess the various options being considered to address the problem. And finally by setting clear objectives with specific measurable targets we will be able to determine the success or failure of the chosen initiatives. Under the feebates concept we are unable to establish a direct link between the decision to impose higher taxes on certain vehicles and a measurable significant reduction in GHG emissions or a quantifiable improvement in air quality. The time for experimentation is passed, we need to focus on actions that bring real results.

3). Older cars are the problem! Older cars pollute more and are less fuel efficient. Moving people into newer cars is the answer. Most new 2001 cars and light duty trucks are equipped with the latest low emission vehicle technology that will reduce smog-causing hydrocarbons, by up to 99%, compared to pre-emission control vehicles. Feebates do not address the fundamental problem of vehicle turnover rate and the related issue of vehicle affordability. BC has substantially more pre-1984 cars than the Canadian average and less cars than Canadian average when it comes to vehicles that meet Tier 1 emission standards (1996-2000).

Luxury tax, gasoline tax, battery and tire taxes and high personal tax rates along with a home grown recession all add up to British Columbian's being less able to afford newer cars. Rather than looking for new ways to tax car owners (feebates, TransLink vehicle tax, end of life vehicle fees) government should be looking for ways to remove and reduce taxes so newer vehicles are more affordable.

In conclusion, we call on the government to shelve the tax shifting initiative. We believe there are higher impact, more affordable alternatives available to government in the quest to put in place a realistic plan to tackle GHG emissions and air quality.

Yours sincerely,

*Original Signed*

PAUL TAYLOR
President & CEO
BC Automobile Dealers Association

## *Canadian Petroleum Products Institute Position Paper*

### CPPI COMMENTS ON DISCUSSION PAPER
### OPTIONS TO REDUCE LIGHT DUTY VEHICLE EMISSIONS

The Canadian Petroleum Products Institute (CPPI) is a national association of Canadian refiners and marketers of petroleum products. Our purpose is to serve and represent these sectors of the petroleum industry with respect to environment, health & safety and business issues. CPPI - Western Division members include Arco Products Canada Ltd., Canadian Tire Corporation Ltd., Chevron Canada Limited, Husky Energy Inc., Imperial Oil Products Division, Parkland Industries Ltd., Petro-Canada and Shell Canada Products Ltd.

CPPI welcomes the opportunity to submit our industry's perspective on the reduction of Light Duty Vehicle (LDV) emissions. We understand the primary focus of this discussion paper is feebates and tax shifting to reduce vehicle GHG emissions. It has been expanded to touch on other areas as well. CPPI's point form summary of our industry's position will cover: (1) vehicle emission reductions; (2) tax shifting/ feebates; and (3) fuel quality and fuel quality incentives

**Vehicle Emission Reductions**

- While vehicle GHG emissions in 2010 are forecast to increase by 38% in BC, the CAC emissions (NOx/VOC) from LDVs are forecast to decline by over 50% from 1995 levels by 2010 and continue to decline to 25% of 1995 levels by 2020. This is in spite of a continuously growing number of vehicles and distance traveled.
- The emissions reduction will be largely due to improved vehicle emission control technology, low sulphur fuels and the continuation of the I&M program.
- The cost effectiveness of further LDV CAC emission reductions needs to take into account the initiatives already adopted.
- CPPI supports cost effective reduction of GHG emissions from the transportation sector. We believe efforts need to be focused on improved fuel economy, reducing urban gridlock and improved public awareness.
- CPPI supports improved fuel efficiency so our customers will be able to utilize the maximum energy potential of the fuels they purchase.
- The National Climate Change Process (NCCP) Transportation Issue Table Options Report confirms that off the shelf vehicle technology can cost effectively deliver 25% increased fuel efficiency. CPPI encourages the automobile manufacturers to commit to improving the fuel economy of all classes of vehicles, either on a voluntary basis or in response to competitive pressures.

**Tax Shifting / Feebates**

- Tax shifting represents a significant government intervention that could dramatically influence market place forces. Even in a revenue neutral environment, the redistribution of consumer costs could have an important impact on individuals and the BC economy. CPPI urges caution with respect to consideration of this policy.
- The elasticity related to transportation demand represents a major area of uncertainty especially when more extreme tax measures (i.e. large fuel tax changes) are being considered. Recent experiences with variations in fuel costs are evidence of this.

- Consumers need to have reasonable alternatives in the face of added taxes or changes in their behaviour are not feasible.
- CPPI is unsure how effective a feebate program would be in enhancing the fuel efficiency of LDV. Based on past experience, we do not believe there is a reasonable precedent of a successful feebate program.

**Fuel Quality and Fuel Quality Incentives**

- CPPI recognizes that fuel quality can enhance/enable CAC emission reductions from LDV. Fuel quality is not relevant to GHG emission considerations for current technology vehicles.
- CPPI supports the alignment of US/Canada fuel quality specifications. CPPI supports the move to 30 ppm sulphur in gasoline and our members are committed to achieve this target between 2002 and 2005. Furthermore, CPPI has already committed their support to whatever reduced sulphur in diesel level is specified in the final EPA regulation expected by year-end 2000.
- Fuel quality issues have been and will continue to be reviewed in other venues and need not be the subject of review by this task force. (i.e. federal, provincial, CCME, GVRD AQMP 2002.)
- Changes in fuel quality will not reduce life cycle GHG emissions from current technology vehicles. The work of the NCCP Transportation Issue Table confirms net GHG emissions will increase as a result of fuel reformulation due to more intense processing at refineries.
- Reduced sulphur and reduced aromatics in gasoline will increase net GHG emissions. Gasoline RVP and Driveability Index have no measurable impact on vehicle GHG emissions. Deposit Control Additives may provide some CAC reduction and fuel economy benefit.
- The manufacturer has tabled evidence, that MMT reduces tailpipe GHG emissions and one of the CACs (NOx). Experience has verified MMT reduces refinery GHG emissions. There is no evidence of reduced fuel economy due to use of MMT.
- CPPI supports fuel standards developed by the multi-stakeholder consensus driven Canadian General Standards Board (CGSB) process. We do not support the unilateral declaration of fuel specifications contained in the automakers World Wide Fuel Charter.
- Future advanced technology vehicles may be capable of better fuel efficiency. The petroleum industry will provide the fuels needed, in the quantities required, as these future advanced vehicles reach the market place.
- CPPI member companies are working diligently to meet the very challenging schedule of the Sulphur in Gasoline Regulation. Plans are set and there are no reasonable options to accelerate an already critical timeline. A tax incentive program would have no impact other than to penalize some refiners and reward others depending on their existing circumstances.
- Independent retailers or major Canadian CPPI refiners do not support tax incentives for advancing introduction of low sulphur gasoline.
- The tax incentive proposal is unfair and the process for its implementation is flawed. The proposal will not be effective in advancing the introduction of low sulphur gasoline and should not be pursued.

Should there be any questions or comments on CPPI's perspective please contact us.

## *Canadian Vehicle Manufacturers' Association Position Paper*

Canadian Vehicle
Manufacturers' Association
Association canadienne
des constructeurs de véhicules

September 29, 2000

**Canadian Vehicle Manufacturers' Association's Position on Feebates, Submitted in Response to the Draft Discussion Paper – "Options to Reduce Light Duty Vehicle Emissions"**

The Canadian Vehicle Manufacturers' Association (CVMA) members include, DaimlerChrysler Canada Inc., Ford Motor Company of Canada, Limited, General Motors of Canada Limited and International Truck and Engine Corporation. Together these companies account for approximately 90% of all vehicles produced in Canada. In B.C. there are 400 automotive dealerships employing nearly 16,000 men and women in communities in all regions of the province.

It is the position of the CVMA and its members that the challenge of addressing greenhouse gas emissions (GHG) requires a balanced approach that fully and fairly considers all sectors, as well as the general public. Such an approach must be implemented in the most cost-effective manner.

The CVMA rejects the use of feebates as an appropriate instrument to address the challenge of reducing vehicle-related GHG emissions. Feebate programs, rather than improving air quality, have been shown to have the perverse impact of delaying the introduction of newer and cleaner vehicles into the marketplace. B.C. already has a vehicle turnover rate 12% lower than the national average.

The National Transportation Climate Change Table, which included representation from B.C., determined Canadian feebates to be an unlikely option for reducing GHGs. Of the many transportation-related options considered, the feebate study concluded that they were among the highest cost per tonne reduction of GHGs. Further, feebates were shown to provide few GHG reductions and to diminish new vehicle sales with a potential for net revenue losses.

According to the draft discussion paper, "Options to Reduce Light Duty Vehicle Emissions", light duty motor vehicles account for 17% of the GHG emissions in the province. Transportation itself is comprised of several elements: air, freight, commercial, agriculture, off-road, as well as light duty cars and trucks. Any action considered by the B.C. government to curb GHG emissions must address all of these elements in addition to other sectors that contribute the remaining 83%. To do otherwise, is to overlook possible higher impact, lower cost opportunities.

The auto industry has introduced many significant vehicle and powertrain technologies to improve vehicle fuel efficiency. These improvements have been accomplished despite conflicting objectives, such as the addition of advanced safety equipment, emission control hardware and consumer wants for options which tend to work against fuel efficiency improvements.

Unlike criteria vehicle emissions (such as carbon monoxide, hydrocarbons, oxides of nitrogen) which can be the same (grams/kilometre basis) for different classes of vehicles, GHG emissions are proportional to the amount of fuel used by a vehicle. Driving behavior and maintenance habits can impact rated fuel consumption by up to 20%. Drivers determine how vehicles are used, the number of occupants, what cargo is carried in the vehicle, the distance traveled (fuel usage), and where the vehicle is driven (city versus highway). Consumers also determine, through their purchase decisions, which vehicles populate the roads based on their own needs such as safety, performance requirements, utility, cargo room, operating and maintenance costs and purchase price. Of all the factors which directly influence fuel consumption, and hence GHG emissions, feebates only affect the purchase price.

Sales data from 1999 shows that the Ontario Tax for Fuel Conservation (TFFC) has not been successful in shifting customer requirements or buying practices. An Ontario government report on TFFC showed that the tax tends to decrease new car sales (with commensurate loss of revenue). Rather than influencing the mix of new vehicles sold, the TFFC has simply increased the cost for consumers and discouraged the sale of newer, cleaner vehicles without affecting overall consumer behavior and driving habits. Feebates provide no incentive for consumers to use, maintain or operate vehicles efficiently. Adoption of a feebate scheme, which discourages new vehicle sales and delays fleet turnover will actually increase the release of smog-causing pollutants such as $NO_x$ and hydrocarbons leading to decreased local air quality. Fewer new car sales also results in the slow down of the introduction of new safety and other technologies

Industrial/commercial users as well as some families, farmers and rural customers legitimately require larger and differently configured multi-purpose vehicles. Feebates increase the capital/financing costs for these groups and make the vehicle affordability challenge even greater for these businesses and families. Additional taxes on vehicles can also encourage cross-border purchases with potential adverse economic implications for the B.C. vehicle dealers. Sales tax revenue from B.C. vehicle sales will likely be reduced.

Vehicle manufacturers have contributed to improving air quality by introducing new vehicles with state-of-the-art emission control equipment. In fact, passenger vehicles and light trucks being introduced under the Low Emission Vehicle (LEV) standards are capable of reducing smog-causing emissions by up to 50% compared to a non-LEV; and by up to 99% compared to pre-emission control vehicles. In 2004, Tier 2 standards will be in place which will bring about even greater reductions (up to 95% from Tier 1) and require that passenger car and light duty truck lines meet on average, the same emission standards. The introduction of a feebate program will negatively impact the marketplace acceptance of this technology.

Air quality improvements in B.C. that can be attributed to motor vehicles are dependent on the turn-over rate of vehicles, the replacement of older vehicles with new advanced emission control technology, and the availability of appropriate fuels to ensure that the design-intended emission reductions are fully realized. Ensuring that these vehicles enter the market at the highest penetration rates will deliver improved air quality benefits sooner.

In working with governments in Canada, the CVMA encourages an approach to reducing greenhouse gases that is balanced among all sectors. Technology can not do it alone. A balanced systems approach must include strategies to address consumer behaviour on a daily basis, transportation infrastructure, traffic management, alternative modes, fuel cost, inspection and maintenance programs, better land use policies, and improved fuel formulations quality and supply.

## *Northwest Environmental Watch BC Position Paper*

**Feebates: Pricing Mechanisms to Reduce GHG's in BC September 2000**
By: Donna Morton with research by Michelle Hoar and Jennifer Tice for NEW BC

Every year there is increasing scientific and anecdotal evidence for the effects of greenhouse gas emissions. Despite the evidence, and the potentially catastrophic impacts of climate change, action to curb emissions has been slow coming. While the policy and technological tools exist to turn things around, there has been a strong resistance on behalf of automobile manufacturers and petroleum producers. Not only are these industries jeopardizing the well being of this and future generations, but they may well turn out to be their own worst enemies.

Friends of the Earth (UK) plan to take legal action similar to cases against the tobacco giants, but this time the corporate targets will be oil, coal and auto producers attempting to block action to implement the Kyoto protocol. As damages from climate change mount, such suits could become commonplace.

Rather than wait for greater damages from climate change, the BC government needs to act now and set an example for the rest of North America. One successful feebate anywhere would make a difference and the 2001 Provincial budget is the perfect opportunity to put gas-guzzlers in their place—behind BC's commitment to the environment, our health and future generations.

The automobile and oil producing lobbies have played a role in watering down or blocking every feebate proposal in North America. The exemplary California 'Drive Plus' program, was passed by the state legislature but vetoed by the Governor after some back room pressure. In Ontario the feebate program is ineffective after being undermined by industry lobbying. Interestingly, it is now held up by industry as an example of how feebates don't work. BC is the test case for sustainability. Feebates are a key step in the right direction, and BC is one of the few jurisdictions with the courage to face climate change head on.

The reality is in Canada that gasoline and diesel-powered vehicles are responsible for 70% of carbon monoxide, 50% of nitrogen oxide, 30% of VOCs (volatile organic compounds), 25% of carbon dioxide, and 65% of benzene. One way to reduce these emissions is to introduce measures that encourage increased fuel efficiency in new cars, thereby decreasing the overall volume of fuel consumed. A vehicle feebate system makes doing the right thing financially attractive by rewarding the purchase of efficient vehicles and penalizing the purchase of inefficient ones.

Though BC has tougher emissions standards than the rest of Canada, addressing *tailpipe emissions* is different than addressing *fuel efficiency*; SUVs (sport utility vehicles), minivans, and other inefficient vehicles can still pass emissions regulations while burning a disproportionate amount of fuel, thereby offsetting their emission controls. Currently, Canada's voluntary fuel efficiency agreements haven't led to improvements since 1985. Feebates are a significant part of any solution to greenhouse gas emissions. Options for implementing a BC-wide provincial vehicle feebate system based on *efficiency* are:

- levy a substantial and noticeable surcharge on the purchase of inefficient cars and use that revenue to credit those who purchase fuel efficient vehicles;
- implement fees and rebates across the whole range of fuel efficiencies, thereby affecting all new vehicle purchases (a similar mismanaged system in Ontario only affects 10% of purchases);
- accompany program with a high-profile education campaign regarding environmental and human health benefits and publicize the revenue neutrality of any measure.

**Benefits:**

- reduction of greenhouse gas emissions and other air toxins;
- encouraged production and purchase of increasingly efficient vehicles thus positioning the car industry for the emerging global market.

**Tax on Sulphur in Gasoline and Diesel**

The amount of sulphur contained in fuels directly affects the emission of fine particulates, nitrogen and sulphur oxides, volatile organic compounds (VOCs), and carbon monoxide upon combustion. The human health hazards and environmental impacts of these pollutants are well-documented.

As of June 1999, federal regulations limit sulphur content in *gasoline*. The Canadian average is currently 343 ppm (among the highest in the industrial world), but new regulations set a limit of 30 ppm by 2005. BC already limits sulphur in gasoline to 150 ppm by 2001.

Since regulatory mechanisms are already addressing sulphur levels in gasoline, the more pressing concern for tax shifting is diesel, especially off-road diesel (used by planes, boats, etc.). Although current regulations affecting on-road diesel exist and are expected to become more stringent, currently nothing regulates sulphur content in off-road diesel, which contains a national average of 2400 ppm.

A revenue-neutral tax shift that raised taxes on high sulphur-content fuels and decreased taxes on low-sulphur fuels would have the following benefits:

- speed implementation of regulated federal 2005 levels for gasoline, and then create economic incentives for refiners and consumers to go beyond regulated standards;
- create economic disincentives to producing and consuming high sulphur diesels;
- reduce sulphur-related emissions of carbon dioxide, carbon monoxide and sulphur oxides, VOC's and fine particulate matter;
- provide a model of comparing the effects of tax shift mechanisms and regulatory mechanisms;
- provide a market for the companies that comply first. The cleanest gas would come to BC's most polluted areas first to address the health and worker safety issues associated with diesel particulates.

Implementing sulphur tax shifts would have great human health and environmental-benefits, but might pose significant challenges, especially where diesel is concerned. Diesel is a commercial and industrial fuel used largely by the trucking industry, which has been very heavily hit by deregulation. The revenue raised from taxes on higher content sulphur could be used partly to help the hardest-hit producers and consumers deal with the initially higher costs associated with low-sulphur diesels. For example, a producer who pays increased taxes for producing high-sulphur diesel would get some of that money back to help the company invest in technology upgrades. Though measures should be taken to help affected transportation workers, care must be taken not to provide unfair subsidies for truck transportation over rail transportation, for instance.

The US is expected to set low-emission diesel technology regulations in the near future. Canada will likely harmonize with US regulations; a BC tax shift could prompt the Canadian diesel fuel industry to take advantage of the emerging market for low-sulphur fuel. British Columbia could lead Canada in anticipating this trend.

## *David Suzuki Foundation Position Paper*

Mr. Dan Perrin
Perrin, Thorau and Associated Ltd.
Victoria, BC

September 29, 2000

Dear Mr. Perrin,

Please include this letter in the appendix to your report as a statement of the David Suzuki Foundation in support of the vehicle "feebate" concept.

It is of utmost importance that the Government of BC, and indeed the federal and municipal governments as well, accept as a guiding principle a key fact: more and more new vehicles are increasingly fuel inefficient, despite technological advances that allow the trend to go in the other direction, towards fuel efficiency. The most recent data on greenhouse gas (GHG) emissions clearly indicates this movement to higher pollution vehicles: total tonnage from "cars" actually dropped between 1990 and 1997 but rose from 2700 kilotonnes to 4430 kilotonnes from "light duty trucks", the category that includes vans, sport utility vehicles, and pick up trucks.

This trend is a direct result of the replacement of "cars" by these other, larger, more polluting vehicles, a marketplace-driven phenomena that is continuing in the period subsequent to 1997. This trend is a vehicular "fashion statement" that is contributing significantly to BC local air pollution problems and to BC's growing GHG emissions, and is a key fact that must guide public policy.

The pollution reduction gains from massive public investments in public transit, HOV lanes, building retrofits, and efficiency programs can all by cancelled out by this "fashion statement" that has no linkages to its external impacts - the atmosphere is currently a free dumpsite, so whether vehicle emissions are high, low, or zero there are no consequences of any sort tied to the vehicles owner or operator. Purchase and use decisions are totally and completely detached from impacts of those decisions. That is another key fact that must be addressed in public policy reform.[3]

It is for these reasons that we support the "standard feebate" option as outlined in your draft report. (We also support many of the other options, in addition to the feebate - we need most of them to start addressing BC's runaway emissions.) The feebate is the most basic price signal possible: purchasers are financially encouraged towards the most attractive vehicle from a GHG emission reduction perspective. Those who choose a high-emitting vehicle and are willing to pay more to pollute more finance that encouragement. Clearly, this allows choice, albeit constrained by price, but that is the reality today for almost every consumer involved in many choices. One could easily make the parallel with automakers rebates, the size of which is linked to purchase price. The feebate would, to some extent, balance that incentive in ecological terms.

The incentive option is markedly different from a regulatory approach, which would be difficult to implement effectively for fuel efficiency at the provincial level. By utilizing an incentive approach in the marketplace, implementation is simpler and as is the signal to purchasers. Flexibility for all stakeholders is maintained but a clear value is placed upon efficiency and, therefore,

pollution prevention. "Early adopters" of new technologies that reflect core values of our society, such as pollution prevention, should be encouraged with incentives, not discouraged with the unaltered relatively high costs of that new technology. The example of gas-electric hybrid vehicles is a very clear illustration of the problem without incentives in place.

At this point we would also like to record our position if favour of improved national fuel efficiency standards, through the federal Motor Vehicle Fuel Consumption Act, passed by Parliament in 1981 but never proclaimed. The current voluntary approach used by Canada has not been effective in stimulating application of the best available technologies and updated standards at the federal level should be a priority.

Doing nothing is another option, one that appears to be the choice of several stakeholders engaged in your process. That choice will signal acceptance of the trend towards the high pollution vehicles that are the focus of automakers' current marketing efforts. That choice means nurturing the trend towards higher levels of vehicular air pollution of all types. From the perspective of the David Suzuki Foundation continuing to do nothing to address the trend towards fuel inefficiency and higher emission levels would be unacceptable.

In conclusion, we urge government to adopt the standard feebate option, in conjunction with other policies such as expanded support for transit, distance-based insurance, support for the cleanest fuels, support for updated federal fuel efficiency standards and other provincial measures that reform taxes and fees in ways that attach the incentive principle to actions that cause pollution. Policy action must be taken and signals sent into the marketplace.

The immense financial, ecological and health impacts of various forms of air pollution and climate change must be addressed as the status quo is not sustainable by any of those three measurements. To allow those impacts to be exaggerated further by the current "fashion statement" in motor vehicles is both unethical and unwise. It will significantly affect current generations, but also future generations that will inherit a massive environmental deficit and deepening climate change with potentially unlimited consequences.

BC has an opportunity to provide national and even international leadership in this policy field. The feebate incentive proposal will not solve the problem, but it should be implemented to send an overdue and very important signal to the public and to key decision makers in many sectors.

Sincerely

*Original Signed*

Gerry Scott, Climate Change Campaign Director

## *Victoria Transport Policy Institute Position Paper*

***Victoria Transport Policy Institute***
Website: www.vtpi.org Email: info@vtpi.org
1250 Rudlin Street, Victoria, BC, V8V 3R7, CANADA
Phone & Fax 250-360-1560
*"Efficiency - Equity - Clarity"*

### Comments on "Options to Reduce Light Duty Vehicle Emissions"

By Todd Litman
*Victoria Transport Policy Institute*

The study, *Options to Reduce Light Duty Vehicle Emissions*, provides a useful basis for identifying and evaluating strategies for reducing automobile pollution that could be implemented by the Provincial government. We appreciate being allowed to participate in this project.

An important point that we would like to highlight is that many of these strategies have significant impacts (benefits and costs) besides emission reductions. In many cases, the value of these additional impacts may be equal to or greater than the emission reduction benefits. We believe that it is important that these additional impacts be considered, so that solutions can be selected that provide the greatest overall benefit to society (Litman, 1999).

We would like to highlight a few specific points:

- Emission reduction strategies that cause vehicle buyers to purchase more fuel-efficient vehicles than they would otherwise choose reduce the per-kilometre cost of driving. As a result, they tend to cause an increase in total vehicle travel. This "takeback" effect typically means that a 10% increase in overall fuel efficiency will increase vehicle travel by 2-4% among vehicles affected. Although there is still a net fuel savings and reduction in climate change emissions, the increased vehicle travel *increases* total traffic congestion, road and parking infrastructure costs, crashes, urban sprawl and some types of pollution (emissions that are related primarily to vehicle mileage).

- Emission reduction strategies that cause an overall reduction in vehicle travel tend to *reduce* traffic congestion, road and parking infrastructure costs, crashes, urban sprawl and mileage-related pollution. Our research indicates that such benefits may be greater in magnitude than emission reduction benefits.

- Some emission reduction strategies also provide equity and consumer affordability benefits. In particular, Distance-Based Insurance and Registration Fees, and Parking Cash Out are two strategies that provide financial savings to people who reduce their vehicle travel, and are particularly beneficial to people with lower incomes.

- We believe that some of these pricing reforms and tax shifting offer significant potential benefits to consumers because they reduce existing market distortions that currently result in excessive and economically inefficient automobile travel. As described in Litman, Komanoff and Howell (1998), a comprehensive set of transportation market reforms could

result in a more efficient and equitable transportation system, providing economic, consumer, social and environmental benefits.

- Since British Columbia is a net importer of vehicles and petroleum, strategies that reduce consumer expenditures on these goods tend to increase provincial employment and business activity, because they shift consumer expenditures to goods that are produced in BC. Information we submitted for this report indicate that a 10% vehicle fuel savings could produce hundreds of additional jobs, and a comparable increase in business activity in the Province (see "TDM and Economic Development", 2000).

Reference:

Todd Litman, Charles Komanoff and Douglas Howell, *Road Relief; Tax and Pricing Shifts for a Fairer, Cleaner, and Less Congested Transportation System in Washington State*, Climate Solutions (www.climatesolutions.org), 1998.

Todd Litman, *Comparing Emission Reduction Strategies*, Victoria Transport Policy Institute (www.vtpi.org), 1999.

"TDM and Economic Development," *Online TDM Encyclopedia* , Victoria Transport Policy Institute (www.vtpi.org), 2000.

# Appendix C – Detailed Context Material

## The Effectiveness of Economic Incentives

The effectiveness of economic incentives in changing behaviour depends largely on the responsiveness of the economy to the incentive. For example, the government may change taxes to make the price of a good significantly higher in an attempt to discourage its use, but if consumers do not significantly reduce the quantity they buy in response to the price increase, the policy may fail.

Demand elasticities are measures of how responsive the demand for a good or service is to a change in a price or other economic variable. Elasticities are helpful tools for understanding how effective a particular economic policy might be. Two common types of elasticities are own-price elasticities and cross-price elasticities.

**Own-price elasticities** measure how the demand for a good changes as its price changes. For example, if the demand for widgets decreases by 10 percent when the price of widgets increases by 10 percent, then the "own-price" elasticity of demand is said to be –1.0. Goods which are necessities, such as food, have low own-price elasticities because consumers have to buy them regardless of their price. So, for example, if the price of all food were to increase by 10 percent consumers would only be able to decrease their consumption by a relatively small amount, so food would be considered 'own-price inelastic'. Conversely, if the price of movie tickets increases by 10 percent, consumers have many other options for entertainment and will be much more responsive to this price increase (by purchasing fewer tickets) than they will be to a 10 percent price increase for food. Thus, movie tickets are more own-price elastic than food.

**Cross-Price elasticities** measure how the demand for a good changes in response to a change in another good's price. Goods that are substitutes for each other will have positive cross-price elasticities so that as the price of peaches increases the demand for peaches will decrease, but the demand for nectarines (a substitute for peaches) will increase. Goods that are consumed together are called complementary goods and they have negative cross-price elasticities. So if the price of staplers increases, the demand for staplers will decrease, and the demand for staples (which are complementary to staplers), will also decrease.

Various own- and cross-price elasticities related to the demand for light duty vehicles and the use of light duty vehicles have been measured. The following table includes a number of relevant elasticity estimates.

| Good and Price | Elasticity Type | Price Elasticity |
|---|---|---|
| Fuel Consumption with respect to Fuel Price | Own-price | -0.18 to -1.0 |
| Vehicle Travel with respect to Fuel Price | Cross-price | -0.1 to -0.26 |
| Vehicle Trips with respect to Parking Price | Cross-price | -0.05 to -0.30 |
| New Vehicles with respect to New Vehicle Price | Own-Price | -0.6 to -0.87 |

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Transportation Elasticities, Patrick McCarthy, "Market Price and Income Elasticities of New Vehicle Demands," *Review of Economics and Statistics*, 78(3), August, 1996.

This table indicates, for example, that as the price of fuel increases by 10 percent, fuel consumption decreases by between 1.8 percent and 10 percent. This range is rather large. One reason for the large range is that the value of an elasticity changes over time. In the short run, for example, people are unable to change their behaviour as much as in the long run so that the short run price elasticities are lower than the long run elasticities. In this example, as fuel prices increase, people are not immediately able to reduce their fuel consumption or number of vehicle trips by much, since they continue to have to work and have family obligations that require driving. Over time, however, they are able to purchase a more fuel efficient vehicle and arrange their affairs to take public transportation, so that in the long run elasticities are higher than in the short run.[39] Even though the long run elasticity is higher than the short run elasticity, both are still quite low, indicating that some level of motor fuel consumption is a necessity for most people.

The wide range of elasticities in the table is typical of elasticity estimates and indicates that caution must be exercised in their use and interpretation. Elasticity values are very specific to the conditions under which they are derived. For example, the new vehicle elasticities in the table are derived by asking how much the demand for all vehicles changes as the average price of all vehicles changes. All estimates are for the US market and all studies were undertaken in different years.

The elasticities for all vehicles are different from the elasticities for individual makes or classes of vehicles. For example, if the price of sub-compact cars increases, consumers don't have many options for buying a smaller or cheaper car, so that the elasticity for this class of car is lower than the elasticity for all cars together. On the other hand, if the price of luxury cars increases, the consumer has many more alternatives in the lower end of the price range from which to chose, so that the own price elasticity of luxury cars may higher than the aggregate elasticity and certainly higher than the elasticity for sub-compact cars. However, there are many factors other than price that affect vehicle purchase decisions and these factors may be relatively more important than price for luxury vehicles than for low-priced vehicles, so the elasticity may be lower.

[39] The OPEC oil crisis provided a natural economic experiment for measuring the impact of a significant fuel price increase. Over the short term, consumers changed their purchases little. However, over the long term people reacted by purchasing more fuel efficient vehicles and manufacturers reacted by making more efficient vehicles available. It should be noted that in the 1970's oil crisis, not only did the price of fuel rise, but its availability decreased, resulting in significant convenience costs to consumers of looking for and waiting for fuel.

Because the assumptions made in different calculations of elasticities are often very different, the range of the elasticity values for any good can be large and the potential to debate their exact value is limitless. The elasticities in the table (and all elasticities in general) are, therefore, perhaps better suited to indicate rough relative orders of magnitude for the effects of alternative policy decisions rather than offering objective, precise, and definitive values.

## *British Columbia Policies and Programs*

This section provides background about government measures currently in place in British Columbia that may be relevant to the issue of reducing light duty vehicle emissions. It includes measures already intended to affect vehicle emissions as well as measures, such as the luxury tax, that are not environmental measures but nevertheless are relevant to this paper.

### Fuel Quality Standards

British Columbia adopted fuel quality standards that required a reduction of benzene, sulphur and other pollution-causing components of gasoline in 1996 to be fully phased-in in 2001 and a reduction of sulphur in diesel beginning in 1995. Recently the federal government instituted fuel quality standards that require sulphur in gasoline to be reduced from current levels of 350 parts per million (ppm) on average for Canada to 150 ppm by 2002 (the current British Columbia level) and 30 ppm by 2005. The current standard in California is 30 ppm of sulphur.

The US federal government is expected to release new standards for sulphur content of diesel fuel by the end of 2000, and most expect the Canadian federal government to harmonize its standards with the new US standards.

Sulphur content is not the only criterion for evaluating the quality of fuel, particularly gasoline. Other factors include the heavy metal content (lead, manganese (MMT), etc), content of certain hydrocarbons such as benzene, olefins and aromatics, vapour pressure, density and deposit reducing additives.

Fuel quality is important for three reasons:

- higher fuel quality, especially reduced sulphur content, will reduce CAC pollution emissions from all vehicles;
- high fuel quality is required for much of the current CAC pollution reduction technology to work effectively, so there is an increased impact for newer vehicles; and
- some fuel efficiency technology requires high quality fuels (e.g. direct injection).

In addition, there is an ongoing dispute between vehicle manufacturers and petroleum producers about whether fuel quality affects fuel efficiency in a material way, and whether there are life-cycle GHG reduction benefits to increased fuel quality. This is a complex technical issue that is the ongoing subject of several multi-stakeholder processes and is beyond the scope of this discussion paper.

## Fuel Taxation

The following table outlines the on-road fuel tax rates in place across Canada as at March 17, 2000 (cents per litre):

| | B.C.[1] | Alta. | Sask. | Man. | Ont. | Que.[2] | N.B.[2] | N.S.[2] | P.E.I. | Nfld.[2] | Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gasoline | 11.0 | 9.0 | 15.0 | 11.5 | 14.7 | 19.2 | 16.7 | 19.5 | 13.0 | 23.5 | 10.0 |
| Diesel | 11.5 | 9.0 | 15.0 | 10.9 | 14.3 | 20.2 | 20.2 | 21.9 | 13.5 | 23.5 | 4.0 |

[1] Local transit authorities in the Greater Vancouver Regional District and the Capital Regional District impose additional fuel taxes to raise revenue for transit purposes (4 cents per litre and 2.5 cents per litre respectively)

[2] Includes estimated provincial value-added sales tax which also applies to fuel sales.

Source: Table H2, Budget 2000 Reports, B.C. Ministry of Finance and Corporate Relations

British Columbia has had different fuel tax rates for alternative fuels for many years. Natural gas and alcohol-based fuels (of at least 85 percent ethanol or methanol) are exempt from motor fuel tax when purchased to propel a motor vehicle. Propane purchased to propel a motor vehicle is subject to social service tax at a rate of 7 percent of the purchase price. It is not subject to motor fuel tax. At a pump price of 40 cents per litre this results in a preferential rate for propane of about 3.7 cents per litre, compared to the 11.0 cents per litre motor fuel tax imposed on gasoline, and the 11.5 cents per litre motor fuel tax imposed on diesel.

In the March 2000 Provincial Budget Speech, the Minister of Finance and Corporate Relations announced the introduction of a new policy to formalize the preferential tax treatment of environmentally friendly alternative fuels. This policy was introduced to provide long-term certainty for these fuels, to encourage fuel suppliers to develop infrastructure for the manufacture and sale of such fuels, and to persuade consumers to purchase vehicles that use such fuels.

Under the policy, qualifying fuels will be exempt from tax until they capture a predetermined market share. Thereafter, tax rates will be phased-in based on market share growth and the fuels' inherent environmental benefits. However, to ensure an ongoing incentive for alternative motor fuels that reduce CAC pollution emissions and/or GHGs, the maximum tax rate will remain below the clear gasoline tax rate on an energy equivalent basis.

## Scrap-It Program

Scrap-It is a voluntary program in the Lower Mainland designed to take older, less fuel efficient and more polluting vehicles off the road. It began with a pilot demonstration program in 1996. To be eligible, vehicles must have failed an AirCare test, be 1987 model year or older and still be in operation. The program provides incentives of $1,000 toward the purchase of a new natural gas vehicle, $750 toward a new vehicle, $500 toward a newer used vehicle, a TransLink pass, $500 toward a bicycle, $750 toward van or car pooling or a Westcoast Express pass. An evaluation of the pilot program in 1997 found the program to be a cost-effective way to reduce CAC pollution emissions, leading to some complementary GHG benefits but not considered effective as a GHG measure in its own right. The evaluation found average fuel consumed by the scrapped vehicles was 15.1 litres/100 kilometres, significantly higher than the fleet average.

## Luxury Tax

In British Columbia, the Social Service Tax or provincial sales tax (PST) rate that applies to most taxable goods and services is 7 percent of the purchase price, excluding GST. Passenger vehicles are subject to tax at the rate of 7 percent, 8 percent, 9 percent, or 10 percent depending on the purchase price, with the higher rates of tax often referred to as the luxury tax. The following tax rates apply to all new and used passenger vehicles.

| Purchase Price of Passenger Vehicle | Tax Rate |
|---|---|
| Less than $32,000 | 7 percent |
| $32,000 or more, but less than $33,000 | 8 percent |
| $33,000 or more, but less than $34,000 | 9 percent |
| $34,000 or more | 10 percent |

Although this tax is not intended to be an environmental measure, since larger and more powerful vehicles also tend to be more expensive, it is seen by some as a rough proxy for a tax on GHG emissions. Nevertheless, it should be noted that some expensive vehicles are quite fuel-efficient.

Incremental revenues from the portion of luxury tax in excess of the standard 7 percent tax rate are estimated by the Ministry of Finance and Corporate Relations to be about $50 million annually.

## Alternative Fuel Vehicles PST Measure

In the 1999 provincial budget a partial refund of PST was provided for purchases and leases of qualifying alternative fuel vehicles, defined as new factory-manufactured motor vehicles that:

- are designed to operate exclusively on electricity, propane, ethanol, methanol or natural gas; as hybrid electric vehicles (i.e. propelled by a combination of electricity and gasoline or another fuel); or as a bi-fuel vehicle (i.e. a vehicle with two separate fuel tanks so it can be propelled by an alternative fuel or by gasoline or diesel;
- are designed for and licensed to be operated on a highway; and
- meet *Motor Vehicle Safety Act (Canada)* standards.

Purchasers and lessees of qualifying alternative fuel passenger vehicles are eligible for a refund of PST of up to $500 (qualifying alternative fuel buses are eligible for a maximum refund of $5,000).

A concession was also provided to ensure that the generally higher price of alternative fuel vehicles compared with similar gasoline or diesel vehicles does not trigger the luxury tax.

This concession works by subtracting $7,000 from the purchase price of new alternative fuel vehicles for the purpose of determining the tax rate. The tax rate is then applied to the full purchase price of the vehicle before the $7,000 reduction. As a result, so long as the price premium charged for alternative fuel vehicles is $7,000 or less, that premium will not result in the tax rate charged increasing due to the luxury tax. In addition, the purchase and installation of kits to convert vehicles to natural gas, propane or electricity are exempt from the sales tax.

### AirCare Program

The AirCare program requires periodic testing of light duty vehicles in the Lower Fraser Valley to ensure that the vehicles meet established emission standards. Vehicles that do not pass the test must be repaired or they can not be insured in the Lower Fraser Valley. Although the program is primarily directed toward reducing air pollution from motor vehicles the program also has an impact on GHG emissions since regular tune-ups and repairs to meet the emission standards also lead to improved fuel efficiency. The program also serves to educate the public about the proper operation and maintenance of their vehicles.

AirCare II is currently being implemented in two phases. Phase One, began September 5, 2000, and includes new equipment, software, test procedures and cut points, and introduces a driving test[40] for all-wheel drive and traction control vehicles.

On January 1, 2001, the program will introduce an enhanced AirCare inspection for newer vehicles (1992 and newer). At that time, newer vehicles will require an AirCare Inspection every two years (biennial), instead of the current annual test.

AirCare Program changes effective September 5, 2000:

- All-Wheel Drive and Traction Control vehicles will now receive a driving test.
- All vehicles will receive a visual inspection of the catalytic converter and a pressurized gas cap test. This gas cap test will ensure that vapors from the fuel tank are prevented from escaping into the atmosphere.
- AirCare standards, or cut points, will be adjusted closer to federally regulated emissions standards for the make and model year of the vehicle. The new AirCare standard will always remain less stringent than the original design standard for the car. The intention is that any vehicle operating correctly and at normal temperature should easily pass the new AirCare standard.

### GHG Emission Reduction Trading (GERT) Pilot

It has been suggested that the most economically efficient approach to reducing GHG emissions is to cap total emissions, allocate emission caps to the various emitters and allow the trading of emission allocations. The result would be that those who are able to reduce

[40] Most vehicles are tested by "driving" the vehicle on the AirCare testing equipment. Previously, the equipment was not able to accommodate all-wheel drive vehicles, but that has now been corrected so that these vehicles can be tested using the same testing protocol as other vehicles.

emissions with relatively small investments will reduce emissions as much as possible and sell their excess emission allocation to someone else who would have a much higher cost of reducing emissions. The purchased allocation would allow the buyer to exceed their established cap at a lower cost than the cost of reducing emissions.

There are many practical issues with this type of arrangement and to be really effective, it probably has to be introduced internationally. This is the focus of considerable work around the world. In anticipation of such a system eventually being put into place, Canada has implemented the GERT pilot as a way to address some of the practical issues. The pilot is being run by the British Columbia Ministry of Environment, Lands and Parks. Although binding emission caps have not been established, the program allows emission reduction trading that will apply when and if the system becomes fully operational.

While this pilot does not directly relate to motor vehicles, it is conceivable that a fully developed system could include trading of GHG emission reductions at the level of the individual vehicle operator, which is discussed as an option for reducing light duty motor vehicle emissions.

### High Occupancy Vehicle (HOV) Lanes

In the Lower Mainland there are a number of HOV lanes which are open only to buses and passenger vehicles with at least a certain number of passengers, usually two or more. Some HOV lanes are on provincial roadways while others are under local government jurisdiction. The purpose is to encourage fewer single or low occupancy vehicle trips, reducing the overall number of vehicle trips and thus the air pollution and GHG emissions associated with those trips. However, some criticize HOV lanes as having a negative effect by increasing road capacity without offering a significant incentive to car pooling because the HOV lanes do not provide significant time savings.

## *Relevant Consultation Processes*

### National Climate Change Process (NCCP)

The NCCP was established immediately after the Kyoto Protocol was negotiated in December 1997 by Canada's First Ministers to develop a national strategy on climate change. Fourteen Issue Tables were established to address the various aspects of the climate change issue, including a Transportation Table. The Transportation Table was comprised of representatives from the federal government, provincial governments, local governments, environmental non-governmental organizations (ENGOs, such as Pollution Probe and the Pembina Institute), industry associations (including vehicle manufacturers and several others) and consumers (Canadian Automobile Association).

The Transportation Table issued a paper entitled "Transportation and Climate Change: Options for Action" in November 1999. The paper was developed using a consensus approach to the extent possible, with non-consensus decisions based on voting. A number of alternatives were developed, research was done to quantify potential impacts and the options were rated into categories of Most Promising, Promising, Less Promising and Unlikely based on economic impact, administrative difficulty, certainty of analysis and other concerns, such as competitiveness. Options were divided into five packages – Passenger, Infrastructure, Road

Vehicles & Fuels, Freight and Off-Road. The packages of greatest relevance to the current process are Passengers and Road Vehicles & Fuels. The following table shows the options in these packages that relate directly to light duty motor vehicles and how they were categorized. The table is taken directly from the report and some of the options are not clearly defined by their titles in the table. For further information, please see the original report at www.ncccp.ca.

In the table, the various measures referred to as "Targets" indicate a voluntary measure agreed to by the automobile manufacturers to increase average fuel efficiency and "Harmonized" refers to harmonized between Canada and the United States.

| Measure | GHG (megatonnes) 2010 | GHG (megatonnes) 2020 | Cost $/tonne |
|---|---|---|---|
| **Most Promising Measures** | | | |
| Driver education | 1.2 | 1.3 | ($78) |
| **Promising Measures** | | | |
| Parking pricing (Terms of Reference/Mtl/Van) | 0.5 | 0.6 | $202 |
| Ethanol Capacity Incentives | 0.8 | 2.2 | $29 |
| AFV fleet purchase | 0.3 | 0.7 | $69 |
| Target harmonized: 25 percent by 2010 over current target | 5.2 | 14.1 | $74 |
| Alternate fuel infrastructure, propane | 0.7-0.9 | 2.6 | $46-$109 |
| Alternate fuel infrastructure, natural gas | 0.7-0.8 | 2.3 | $120-$208 |
| **Less Promising Measures** | | | |
| Accelerated vehicle retirement | 0.2 | 0.0 | $62 |
| Parking pricing | 7.7 | 8.6 | $89 |
| Urban road pricing | 1.4 | 1.5 | $120 |
| Vehicle inspection and maintenance | 0.4 | 0.0 | $1350[41] |
| Feebate, harmonized with phase-in | 2.1 | 13.1 | $100 |
| Alternate fuel infrastructure, ethanol high | 2.3 | 8.3 | $46 |
| Alternate fuel infrastructure, ethanol low | 2.0 | 4.9 | $54 |
| Vehicle purchase incentive, 30 percent best of class | 2.1 | 6.4 | $41 |
| **Unlikely Measures** | | | |
| Distance-based vehicle charges | 0.2-0.4 | 0.4 | $146-$190 |
| Parking supply restrictions | 0.2-0.4 | 0.3 | N/A |
| Feebate, harmonized | 2.1 | 13.1 | $116 |
| Ethanol capacity incentives, low | 0.5 | 0.5 | $36 |
| Target harmonized: 2 percent per year over current target | 1.1 | 7.9 | $54 |
| Target harmonized: 2 percent per year over actual fleet ave. | 1.9 | 10.1 | $60 |
| Feebate Canada only | 2.3 | 5.1 | $309 |
| Feebate Canada only phased-in | 2.3 | 5.1 | $279 |
| Target harmonized: 25 percent by 2010 over actual fleet ave. | 6.5 | 16.5 | $105 |
| Target Canada only: 2 percent per year | 1.1 | 7.9 | $114 |
| Target Canada only: 25 percent by 2010 | 5.2 | 14.1 | $157 |
| High-efficiency fleet purchase incentives | 0.2 | 0.3 | $220 |
| Vehicle purchase incentive, 40 percent best of class | 0.5 | 2.0 | $35 |

Source: Transportation Table, Transportation and Climate Change: Options for Action, Table 5.2 and 5.4

[41] This cost estimate is not an estimate of the cost of the AirCare program. The cost per Tonne of $CO_2$ reduced for vehicle inspection and maintenance programs is relatively high because the programs are directed primarily toward reducing pollution and the resulting GHG reductions are a side-benefit. A program review of AirCare has shown the program to be cost-effective in meeting its primary objectives.

## BC Greenhouse Gas Forum

The BC Greenhouse Gas Forum was established in 1997 to provide a mechanism to bring together public and private sector interests with a stake in addressing the climate change issue to build a consensus on the most appropriate approaches to address the issue from British Columbia's perspective. The members include federal and provincial and local governments and agencies, labour, ENGOs (such as the David Suzuki Foundation, Environmental Youth Alliance and West Coast Environmental Law), industry groups (including the Business Council of BC, Canadian Association of Petroleum Producers and the Mining Association but no vehicle manufacturer or retailer representatives) and consumers (BC Automobile Association).

The BC GHG Forum has produced three reports, in 1998, 1999 and 2000 with recommendations and status reports. Recommendations relevant to the current process (some of which have been implemented) include:

- Public education program to increase public awareness of the problem and reduce barriers to action;
- Centre of GHG Technology;
- R&D Incentives and promotion;
- Community energy management, treating energy use and transportation in a holistic manner in the context of community planning;
- Vehicle feebate program;
- Vehicle sales tax exemption for zero or extremely low GHG emissions;
- Provincial or national fuel efficiency standards;
- Government fleet GHG policy;
- Ethanol production from BC biomass; and
- Actions to increase transportation mode shifting such as transportation demand management programs, enhanced transit, carpool lanes, cycling infrastructure, transportation and land use planning.

## Cleaner Technology Vehicles (CTV) Committee

The CTV Committee was formed in 1996, under the *Motor Vehicle Emissions Reduction Regulation* (December 1995), which is a key tool in the BC Government's Clean Vehicles and Fuels Program. The regulation sets targets that call for an increasing proportion of vehicles sold in the province to be ultra-low and zero emission. By 1998, all new vehicles sold in BC were required to meet the US federal emission standards (which are now the same as the Canadian standards for the 1998 model year). In addition, as of 2001, new vehicles sold in BC should meet California's even more stringent low-emission standards, on a fleet-average basis.

The CTV Committee's mission is to help achieve these targets. It represents the major industry and government sectors involved in the use, sale, production and/or regulation of alternative vehicles and fuels. Specifically, its regulatory mandate is to:

- promote the use and procurement of CTVs, to reduce emissions (including GHGs) from motor vehicles;
- promote CTVs through fleet purchases and consumer marketing, to meet the targets established in the regulation; and
- identify obstacles to CTV sales in BC, and recommend ways to overcome such restraints.

## *Government Measures under Consideration*

### ICBC Measures

ICBC is currently reviewing a number of measures that have the potential to affect GHG emissions from light duty motor vehicles. These include:

- limited incentive/reward programs to promote new vehicle technology;
- traffic demand management (TDM) as a means of managing areas of traffic conflict and reducing the rate of traffic growth; and
- Intelligent Transportation Systems (ITS) which would automate the collection of considerable information about vehicle operations which would allow sophisticated pricing of insurance, license fees and road taxes.

The second and third items on the list will require considerable technical development, work with other related agencies and public consultation prior to being considered for actual implementation.

### Access to HOV Lanes

Consideration is being given to allowing certain lower GHG emission vehicles access to HOV lanes. The reasoning is that HOV lanes are intended to reduce GHG emissions and that access to the lanes by a few low emission vehicles would not reduce the incentive created by HOV lanes for more multi-passenger trips but would be a real incentive to purchase a low emission vehicle. However, some believe that such use of the HOV lanes would be inappropriate. No final decision has yet been made.

### TransLink Vehicle Levy

Translink (also known as the Greater Vancouver Transportation Authority) is responsible for transportation in the Greater Vancouver Regional District (GVRD), including transit and road infrastructure. Translink produced a Strategic Transportation Plan which was approved in April of 2000. It calls for substantial road investment and expansion of transit services over the next five years. The principle adopted for financing this investment is to have "transportation pay for

transportation." That would include continued use of the gasoline tax and surtax, transit fares, and adding vehicle levies and increased parking fees.

The plan calls for an average fee of $75 per vehicle, raising about $95 million annually. However, the structure of the fee has not yet been decided. Options under consideration include a flat fee, a variable fee based in insurance use classification, a variable fee based on vehicle weight and a fee that recognizes the availability of transit in the owners home area. In addition, due to the public outcry against the proposed vehicle levy, other options are also being raised for discussion, including increased fuel taxes of up to 5¢ per litre, road tolling and property taxation.

Depending on the approach ultimately taken, the financing of Translink's Strategic Transportation Plan may have an impact on GHG and CAC pollution emissions in the Lower Mainland.

## *Activity in Other Jurisdictions*

### Mandatory Fuel Economy Standards

CAFE (Corporate Average Fuel Economy) standards are statutory minimum fuel requirements for a class of vehicles sold by a manufacturer in a specific regional or national market. In principle, the CAFE levels could be developed to be tradable among manufacturers.

CAFE standards were first legislated in the US in 1975 and continue today. Separate standards exist for cars and light trucks. For passenger vehicles, these stand at 27.5 miles per US gallon (8.6 litres/100 kilometre), and for light trucks, they are 20.7 miles per gallon (11.4 litres/100 kilometres), and penalties exist for manufacturers who do not meet the CAFE standard.

A gas guzzler tax was also introduced in the US in 1980. In 1991, the tax was $1000 for pasanger cars achieving less than 22 miles per gallon (12.8 litres/100 kilometres) and $7700 for those with a fuel efficiency of less than 12.5 miles per gallon (22.4 litres/100 kilometres). The tax does not apply to light duty trucks.

Canada adheres to the CAFE standards set for the US through a voluntary agreement with vehicle manufacturers rather than by establishing a separate regulatory requirement. In Japan, targets have been set for car fuel economy within size classes. The European Union also participates in CAFE standards. The EU recently accepted the voluntary proposal of the European Automobile Manufacturers Association to improve the average fuel efficiency of new cars to 6 litres/100 kilometres by 2008.[42]

### Feebate (not necessarily revenue neutral)

Austria introduced a feebate in 1992. Before 1992, new vehicles were subject to a 32 percent tax. After the new scheme was introduced, vehicles with better fuel economy than 8 litres/100

[42] Note that this target is to be achieved in part through the extensive use of diesel powered vehicles which are currently estimated to be 40 to 50 percent of sales.

kilometres paid less than the original tax. Vehicles with fuel economy of 8 litres/ 100 kilometres continued to pay a 32 percent tax and vehicles with worse fuel economy paid an increasing tax up to 10 litres/100 kilometres for gas-powered vehicles and 9 litres /100 kilometres for diesel-powered vehicles, when the maximum rate of 37 percent was reached.

Ontario also has a feebate. Currently the tax is a flat $75 for cars with fuel efficiency between 6.0 and 8.9 litres/100 kilometres (almost 90 percent of car purchases). From 9.0 to 9.4 litres/100 kilometres the fee is $250, from 9.5-12.0 litres/100 kilometres it is $1200, from 12.1-15.0 litres/100 kilometres it is $2400. For higher fuel consumption it rises further but very few cars lie outside this range. It also applies to SUVs, but not to pickup trucks and vans. The fee does not kick in for SUVs until the 8.0-8.9 litres/100 kilometres range where it is $75. From 9.0-9.4, it rises to $200. In the range 9.5-12.0 it is $400; from 12.1-15.0 litres/100 kilometres, $800; in the range 15.1-18.0 litres/100 kilometres, $1600; and above 18.0 litres/100 kilometres it is $3200. Cars (but not SUVs) with fuel efficiency better than 6.0 litres/100 kilometres receive a $100 reduction in the provincial sales tax otherwise payable. The Ontario feebate is not revenue neutral, generating an estimated $40 million in net revenue per year.

Vermont is studying a feebate proposal to levy a fee on model year 2000 vehicles with a poorer fuel efficiency than 21 miles per gallon (13.5 litres/100 kilometres) and offer a rebate to vehicles with a fuel efficiency of 35 miles per gallon (8.0 litres/100 kilometres) or better.

### Luxury Tax

The luxury tax acts as an indirect (and imperfect) incentive to purchase more fuel efficient vehicles because the price of a vehicle and its consumption of fuel tend to be positively correlated. In general, luxury vehicles are heavier, have larger engines and are therefore less fuel efficient. However, it is imperfect because a number of expensive vehicles are quite fuel efficient.

Many jurisdictions (including BC) impose luxury taxes. For example, in 1997 the following luxury taxes were in place. Australia: 23 percent on vehicles with wholesale prices above A$52,000; Denmark: premium on the registration fee in the amount of 75 percent of the sales-tax inclusive retail price for cars above 34400 DKr; Italy: 5 million-12 million Llt depending on engine size.

There is currently a luxury tax in the United States of 5 percent of the value of new vehicles in excess of $38,000, with exemptions for large vehicles, trucks and SUVs. The tax is currently being phased-out and is scheduled to be abolished as of January 1, 2003.

### Tax Credits for Low Emissions Vehicles

In mid-June, the Advanced Technology Motor Vehicle Fuel Economy Act of 2000 was introduced in the US. It would provide tax incentives to vehicle manufacturers to produce and sell, and consumers to use, fuel-efficient, hybrid vehicles. The tax credits would vary according to various characteristics of the vehicle. One credit would be based on the power storage capacity (the battery) of the vehicle, providing from $500 for 5 percent-10 percent storage capacity to $2,000 for 30 percent capacity. Another variable tax credit would apply to the regenerative braking system that recharges the battery, from $250 for 20 percent-40 percent of energy available from braking, to $1,000 for above 60 percent. In addition, the bill would

authorize a study, conducted by the Department of Transportation and the National Academy of Sciences, on "the use, acceptance, effectiveness, costs, impact on mobility, and other relevant factors" (such as the effect on the national economy and future energy supplies) of energy conservation efforts in the transportation sector.

Individual states are also considering credits for low emissions vehicles. Maryland has approved a tax credit for electric vehicles against the 5 percent vehicle excise tax, limited to $2,000. Hybrid cars would be eligible on a sliding scale, dependent upon certain characteristics. Georgia recently signed into law a bill that expands an existing income tax credit to encourage individuals and businesses to make use of low-emission or electric vehicles. Effective January 1, 2001, individual taxpayers will receive an income tax credit of $2,500 over three years for the purchase or lease of, or conversion to, such vehicles, increased from $1,500 under previous law. The $2,500 tax credit is extended to businesses for the purchase or lease of electric vehicle chargers. A tax credit is also available for taxpayers who install diesel particulate emission reduction technology equipment at truck stops, depots or other facilities. The technology will allow the vehicle motors to continue to power heat, air conditioning, light and communications devices while the engine is turned off, to reduce particle emissions.

Such policies, however, are not limited to the developed world. China announced on July 21, 2000 that it would offer tax incentives to purchasers of clean-emission vehicles by reducing sales taxes by 30 percent for vehicles that have achieved the emissions standard used in Europe, known as "European 2". To qualify for the tax break, the vehicles will be inspected at the point of manufacture by government inspection teams. China currently taxes vehicles based on cylinder size. It also has (weakly enforced) emissions standards for vehicles. Beijing and Lanzhou are considered to be among the most polluted cities in the world.

### Increased Fuel Taxes

In general, fuel taxes are much higher in Europe than in Canada, and have been used as an instrument to reduce GHGs. In Canada, over the past five years gasoline taxes have been about 40 percent of the price of retail prices of about 60 cents per litre. In the US gasoline taxes have been everywhere less than 40 percent (and in some states as low as 25 percent) of average prices over the past five years. In comparison, the UK, the Netherlands, France, Germany and Italy all have taxes on unleaded gasoline that comprise more than 70 percent of the final price.

Although much of this phenomenon is motivated by the need for revenue, it is also partly environmentally motivated. For example, Norway increased petrol taxes by 70 percent in the period 1990-1997 in response to the concern about GHG emissions. In the UK, fuel taxes increased by 7 cents a litre in 1993, and a commitment was made to increase them each year by at least 5 percent more than inflation to reduce GHGs. The actual increases in fuel taxes have been higher than this commitment.

### Parking Policies

The Maryland Commuter Benefits Act of 2000 took effect as of July 1. The Act expands existing commuter benefits to offer employers, including non-profit organizations, a state income tax credit against state taxes for providing "cash in lieu of parking" or for guaranteeing a ride home to commuting employees who need to leave work early. Not-for-profit organizations would be

able to apply the tax credit toward payment of employee payroll taxes or social security insurance premiums.

### Ride Share Policies

Washington State implemented a Commuter Ride Share Business and Occupational Tax Credit as part of its Commuter Trip Reduction program to reduce peak hour, single occupant vehicle commute trips made by people traveling to work in the state's nine most populous counties. Employers were allowed a 50 percent credit against payments made to employees who participate in the ride-sharing program. The ride-share had to have at least four occupants. Payments of up to $60 per worker with a maximum of $100,000 per employer were allowed. A credit of 30 percent was made for a range of other transportation alternatives. The program ended in 2000, when the Business and Occupational Tax Credit was eliminated due to a funding shortage.

### Subsidies for Repairs and Scrappage

As of July 1, 2000 California motorists are benefiting from a fiscal incentive to either repair vehicles that fail the state emissions test or retire failed vehicles from use. Administered by the Bureau of Automobile Repair, the program is designed to address California's smog problem. Motorists whose household income is at or below 185 percent of the federal poverty guidelines qualify for repair assistance of $500. Individuals who qualify must pay the first $20 towards diagnosis or emissions-related repairs before the state makes its contribution. All motorists who do not qualify for the repair initiative and wish to retire vehicles from use can receive $1000 from the state. Retired vehicles are sent to "vehicle dismantlers," which recycle all possible material.

### Distance Based Insurance

The following is an excerpt from an agreement between the EPA and the Progressive Auto Insurance Company under which the EPA will evaluate the environmental implications of the company's usage based insurance program.[43] The results of the evaluation are expected to be available in 2002.

> II. Project Description
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> A. Progressive Auto Insurance Company's Pay-as-you-Drive Program
>
> Progressive Auto Insurance company has piloted a unique voluntary insurance program in the state of Texas. Most auto insurance rates are based on a number of factors, including: age, sex, marital status, and where the driver lives, while more specific information about customer driving patterns such as mileage driven, time of day and location of driving, are generally not taken into account because of the difficulty involved in monitoring and tracking the information. In response to this, Progressive has worked cooperatively with a technology firm to

[43] See www.epa.gov/projectxl/progressive/index.htm

install in their customers' vehicles a global positioning system device which, in addition to providing personal security, and roadside and directional assistance, also monitors a number of other factors, including: time of day, amount of driving, and estimated geographic location of driving (whether the customer is in a rural area, urban area, or small town.) The company can then use these additional factors in its "Autograph" Program in determining auto insurance rates which are more specific to individuals' driving habits.

It has been estimated that roughly 80% of an individual's transportation costs are fixed once one purchases a car; that is, 80% of costs remain the same on a monthly basis regardless of how much or how little one drives. With the Progressive system, some of the fixed costs now become variable costs which will be influenced by the customer's monthly driving activity. Progressive's system is designed not only to lower costs for its customers, but also to encourage positive driving behaviors which lead to a reduction in accidents and thefts. By offering this system, Progressive is providing its customers a financial incentive to drive less and choose alternate forms of transportation, such as public transit or walking, and in so doing reduce the negative environmental impact resulting from higher levels of automobile usage. In this XL Project, EPA is working cooperatively with the Department of Transportation on a study to determine the environmental impact of this insurance product. The parties that will sign this XL Agreement are USEPA and the Progressive Casualty Insurance Company.

B. Progressive's Commitments

The company has already piloted the technology and the insurance product. Progressive's commitment to this XL Project involves making available to EPA aggregated data on participants' driving mileage and times of day that participants are driving. This will allow the Agency to analyze Progressive's data and make determinations about increases or decreases in driving mileage in response to the use of this product. In addition, Progressive is committing to working cooperatively with auto manufacturers to increase the availability of the product; this will be of assistance to the study's designers, who would like to include regional effects to whatever degree is possible.

## *Automobile Industry Activities*

The automotive industry has worked to improve vehicle fuel efficiency, vehicle emissions and vehicle safety. Safety, emissions performance and fuel efficiency are conflicting objectives that the industry has attempted to balance.

### Pollution Control Activities

The auto industry has to date introduced several generations of progressively more sophisticated emission control systems to meet increasingly more stringent regulatory control of criteria pollutants implicated in smog formation. Auto manufacturers have reduced volatile organic compounds and oxides of nitrogen by more than 97 percent and 90 percent respectively since the pre-control era through the use of emission control technology.

More stringent emission technology is currently being introduced. Low Emission Vehicle (LEV) technology is being introduced voluntarily on a national basis for all passenger cars and light duty trucks (with a gross vehicle weight of less than 2728 kg) for the 2001 model year. These vehicles are capable of reducing smog-related emissions of hydrocarbons by 99.3 percent and oxides of nitrogen by 95 percent compared to pre-controlled vehicles, provided that the vehicles are operated on gasolines that are low in sulphur (30 ppm).

In 2004, the industry intends to introduce vehicles capable of meeting even more stringent Tier 2 emission standards (linked to fuel quality) introduced federally in the United States (U.S.). The Tier 2 standards are unique in that they dovetail the passenger and light-duty vehicle standards when fully implemented and all passenger cars carrying vehicles up to 4550 kg will meet the same emission standards. These new standards will require, by regulation, low sulphur gasolines.

## The Auto Industry and Climate Change

The auto industry invests in research and technology development to improve vehicle energy efficiency. Programs include the Partnership for New Generation Vehicles (PNGV), as well as individual company research and development programs. Areas of emphasis include advancing the state-of-the art drive train and emission control technologies, developing new lightweight materials and enhancing aerodynamics. Vehicles are being developed and showcased to demonstrate advanced technologies including hybrid, electric, compressed natural gas (CNG), fuel cells and advanced direct injection compression ignition engines. Some manufacturers have introducing some of these technologies to the market place and others are to follow suit.

The Transportation Table Report, under the national implementation strategy development, clearly recognized the significant amount of time required for the penetration of these technologies into the market. The timing to complete research and achieve high volume production (assuming affordability and infrastructure issues are resolved) with full market penetration (replacement of the current fleet) could be beyond the first commitment period under the Kyoto Protocol.

## Fuel Quality

Clean gasoline (sulphur at <30 ppm) is required for the advanced emission control technologies on today's low emission vehicles. Fuel quality is an enabler for the fuel-efficient technologies in the near to mid-term (advanced direct injection gasoline engines, and hybrid and fuel cell vehicles).

The petroleum industry is currently in the process of supplying low sulphur gasoline and preparing to comply with expected fuel quality standards for diesel. However, the petroleum industry and vehicle manufacturers have a long-standing and ongoing dispute about fuel quality issues. This is a complex technical topic which is the subject of ongoing consideration in several multi-stakeholder forums. It is beyond the scope of this discussion paper to consider the fuel quality issue in any further detail.

## Public Education

With respect to educating the public on their purchase choices of new vehicles, the EnerGuide Label was developed by the auto industry in conjunction with Natural Resources Canada. The program is similar to that of the EnerGuide labeling for appliances but is much more sophisticated in that it shows the annual fuel consumed and the costs. Consumers are then in a position to compare the fuel efficiency of one vehicle versus another in terms of annual average fuel costs.

Manufacturers also fund the publication of the Fuel Consumption Guide that provides consumers information to evaluate the fuel efficiency of various products in the marketplace that they are to purchase. The manufacturers work closely with dealer organizations to ensure the availability of these consumer education materials.

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